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THE AMERICAN GAS LIGHT JOURNAL

R.C.MAN&KENNY,N.Y.

PUBLISHING OFFICE No. 32 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXX.—No. 24. Whole No. 1,253. | NEW YORK, MONDAY, JUNE 12, 1899. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

Published on each Monday of the year, at No. 32 Pine Street, New York.

Collections are invariably made directly from this office for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $4.50 (19 shillings—22½ francs). All payments to be made in advance. Single copies, 10 cents.

Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Twenty-second Annual Meeting, Western Gas Association.

WESTERN GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
NEW ALBANY, IND., May 10, 1899.

To the Members of the Western Gas Association :

The twenty-second annual meeting of the Western Gas Association will be held in Milwaukee, Wis., June 14, 15 and 16, 1899.

The meeting will be called to order by the President, Mr. George Treadway Thompson, at 9:30 A.M., Wednesday, June 14.

Mr. E. G. Cowdery, Chairman of the Committee of Arrangements, reports that the Hotel Pfister has been selected as headquarters, and that the meetings will be held in its banquet room.

Arrangements for the entertainment of the guests are not as yet wholly completed. Those that have been determined upon are as follows :

A reception to the gentlemen and ladies present will be given by Mr. Cowdery at his residence on Wednesday evening.

A banquet, to be provided by the Association, in which the ladies will participate, will be held on Thursday evening in the main dining room of the Hotel Pfister. Several novel features will be introduced on this occasion, which will, it is believed, add very materially to the entertainment of guests, and it is urged that members do not fail to provide themselves with tickets in advance.

Tickets for banquet will be sold at $5 each, and will entitle the holder to all privileges of the excursion which will be provided for Friday.

As it is necessary that arrangements for this banquet and excursion should be perfected at a very early date, it is requested that all those who expect to attend the meeting will purchase their tickets, or notify the Committee as early as possible of the number of tickets they will require.

The gas works, the E. P. Allis works, the breweries and other places of interest, all of which will be easily accessible by electric cars, will be open to the inspection of visitors during the week. A list of such places will be made up, with directions for finding same easily.

Accommodations can be secured at the following first-class hotels, all within five minutes' walk of the Pfister :

Hotel.	American Plan.	European Plan.
Hotel Pfister.....	$3.00 to $5.00	$1.50 to $3.50
Plankinton House.....	3.50 to 5.00	2.50 to 3.50
Hotel Davidson.....	....	2.50 to 3.50
St. Charles Hotel.....	2.00 to 3.00	....
Schlitz Hotel.....	....	1.00 to 1.50
Hotel Blatz.....	....	2.00 to 5.00

The Executive Committee has arranged for the presentation of the following papers :

"Causes Underlying the Formation of Naphthalene and their Prevention," by Mr. Paul Doty, Grand Rapids, Mich.

"Vitrified Clay Pipes Instead of Iron for Gas Mains," by Mr. Irvin Butterworth, Columbus, O.

"Furnishing Gas at Higher Pressure and without Leakage," by Mr. F. H. Shelton, Philadelphia, Pa.

"A Foundation That Failed and the Lesson It Taught," by Mr. B. E. Chollar, St. Louis, Mo.

"Cyanides in the Gas and Waste Products at Columbus, O.," by Mr. E. E. Eysenbach, Columbus, O.

"Problems in New Business : Some History and Experiments," by Mr. F. B. Wheeler, Binghamton, N. Y.

"Wrinkle Department," edited by Mr. E. H. Jenkins, Buffalo, N. Y.

"Report of Committee on Isolated Generators for Bench Firing," by Messrs. F. Bredel, Irvin Butterworth and W. E. Steinwedell, Committee.

The Western Passenger Association, from points in Eastern and Trans-Missouri territories, the Central Passenger Association, Trunk Line Association, Southeastern Passenger Association, the Wisconsin Central Lines, Chicago, Rock Island and Pacific Railway Company, the Chicago and Alton Road, have granted rates of one and one-third fare for the round trip, conditional on 100 certificates being presented to the Secretary for indorsement. The territory embraced by the above Associations includes all States east of the Mississippi River, except New England. The following States and Territories west of the Mississippi River are in the territory covered by the railway associations granting reduction: North Dakota, South Dakota, Minnesota, Iowa, Missouri, Nebraska, Kansas, Oklahoma, Indian Territory, Colorado and Utah.

All persons attending the meeting will purchase a first class ticket at starting point, paying full fare for same, obtaining from agent a certificate stating that the person whose signature appears on same has purchased, at full tariff fare, one first class ticket to Milwaukee, which certificate, after it has been signed by the Secretary of the Association and a representative of the above Passenger Association, will entitle the purchaser to a one-third rate returning home.

Apply to ticket agent at least 30 minutes before departure of train. All station agents do not have a supply of certificates, but they can be obtained by request, if notification is made in time. Persons outside the territory embraced by the Passenger Associations mentioned above should purchase a ticket to nearest point within one of said Association, and from there purchase a ticket to Milwaukee, obtaining a certificate which will, if properly endorsed in Milwaukee, entitle them to a one-third fare returning to place from which certificate was obtained, provided it is endorsed by a representative of the Passenger Associations, who will be present at the meeting, and the undersigned.

Those who live in Western Passenger Association territory should consult local agents several days in advance of purchasing ticket to Milwaukee, in order to reach an understanding with the different roads as to the junction point via which they will make rates applicable. Some local agents sell to junction points, where delegates can rebuy to destination. Certificates held by wives of the delegates attending the meeting will be honored in the same manner as those held by the delegates themselves.

All queries sent the Secretary for the "Question Box" will be assigned to members for answers.

Mr. E. G. Pratt, of Des Moines, Iowa, is Chairman of the Committee on Extension of Membership, from whom, as well as any of the local committeemen, blank applications for membership can be obtained.

The Secretary will be pleased to answer any communication pertaining to the meeting, and will mail blank applications to any who desire to become members of the Association.

JAMES W. DUNBAR,
Secretary.

BRIEFLY TOLD.

THE TWENTY-SECOND ANNUAL MEETING OF THE WESTERN GAS ASSOCIATION.—The Western Gas Association will hold its twenty-second meeting this week in Milwaukee, and its hosts will be the city and a Committee of Arrangements, directed by Mr. E. G. Cowdery, of the Milwaukee Gas Company. Such hosts are guarantees, enough and to spare, that the Association will lack none of the attentions and service which go to cause voyagers to feel that, though away from home, they are amongst their own people—for such is the fraternity of gas men. A sad cloud colors the assembling, in that it is feared President Thompson may not be able to preside over the Association's deliberations, for the disease from which he suffers has been progressive to the point of aggressiveness; but whether or not that clever, accomplished and consistent gentleman fails, from physical ills, to round out his term of office in active service, the members should remember that their best reward to him will be in having caused his meeting to be the equal of any other meeting in the Association's history. This help is his due, for in his efforts to sustain and advance its purposes and aims no other member has been more persistent and insistent. The delegation from this section of the gas world that will share the hospitalities of the meeting will not be as strong numerically as many that have gone before; but the paucity is not to be attributed to lack of fraternal feeling or to absence of interest in the Western's doings, the plain fact being that many engaged in the gas business in this section are a trifle or more at odds amongst themselves over the best policy to pursue in the instance of teaching the local electricians that gas is still king. The general features of the programme for the meeting remain as they did before—indicative of sessions brimful of interest from a technical point of view and complete from a social standpoint. And this reference would be incomplete were not particular mention made of the cleverness and assiduity shown by Secretary Dunbar in his sensible, methodical control of the preliminaries consequent upon the Milwaukee convention.

LOUISVILLE LEADS THE WAY.—With exceeding great satisfaction we report that the proprietors of the Louisville (Ky.) Gas Company have determined to indorse the suggestions of their Engineer (Mr. A. H. Barret), made by him over two years ago, that, in the reconstruction of their generating department, modern practice should prevail. Despite the opposition of the impractical element in the Company's shareholding ownership, Mr. Barret persisted in his thought that a gas engineer might fairly be counted on to know more about advances in gas manufacturing practice than were even comprehended by people engaged in the insurance business, and the net result of his insistence is that the Louisville Gas Company is now under contract to remodel (rather, to rebuild) its generating department. In general terms it may be said that the Company will construct a new retort house in which will be placed 20 benches of inclined 6's, erected in accordance with the latest principles of such erections. As the work advances we will be able to let our readers know more of the details of the construction. Meanwhile it is satisfactory to note that in the reorganization of the Louisville Company's executive management, its President (Mr. Udolpho Snead) is in good accord with Engineer Barret, and the latter—to the writer's knowledge—has served the Company faithfully and well for 25 years or more.

"TO SEE OURSELVES AS OTHERS SEE US."—The *Journal of Gas Lighting*, dated the 30th ult., had this to say editorially, under the caption of the "Gas Rate War in New York:" The business side of the illuminating gas industry of the United States is far from exhibiting the humdrum charecter of our own highly respectable system of statutory companies and monopolistic local authorities. It has been remarked on previous occasions in these columns that the ways of American gas administrations are peculiar. The gas supply of British cities and towns has no secrets for anybody. The accounts of the undertakings are published; and financial operations in gas are carried on under the simple rules of the auction room. American practice is altogether different. The sense of security which sends the British gas director comfortably to sleep at his board meetings is altogether absent from the breast of his closest Yankee analogue. Similarly, the position of the American gas consumer is very different from that of his British prototype. Mr. A. C. Morton, of the Corporation of the City of London, being dissatisfied with the existing Metropolitan gas settlement, sighs for a return of the days of competition in gas supply. If the distinguished Corporator will take passage for New York by the next boat warranted to keep off the Cornish coast, he will find himself in a few days transported to the Golden Age of his regrets. For New York is actually again in the throes of a "gas rate war," as will be seen by the account of the affair, taken from our American contemporaries, which appears in our news columns. As usual, it is not easy to understand the local journalistic story—partly by reason of the obscurity of the diction, but chiefly because these upheavals are never preluded by open discussion of the premonitory signs of any impending trouble. The great American gas business is worked by astute gentlemen who do not show their hands to anybody. One of our American contemporaries remarks that "close observers who have followed the development of conditions in the New York gas situation" will not be surprised at the outbreak of a war of rates between the erstwhile associated local gas companies. But what has there been to observe? Have any of the Gas Managers' Associations, or has one of the technical journals, touched upon the possibility of an economic eruption in comparison with which the usual small talk about gas topics must appear the veriest trifling? It is confessed, now "the fat is in the fire," that the whole affair is an unpleasant one for everybody; but the most depressing thing about it all is the proof it affords of the economic blindness and backwardness of the American State Governments. All the money sacrificed in this mad contest between rival private interests will have to be made good, and more, by the docile American public. The winners in the affray will build themselves bigger and faster steam yachts, and pay more for their European tours than ever; and the New York gas consumer will find his bills adjusted to suit. The most striking moral of the story is the one we have often repeated—that people on this side with money to invest had better leave all American gas "securities" severely alone. These things are for home consumption exclusively.

[Written for the JOURNAL by "R."]

Gas Piping Topics.

Friction and pressure are potent factors in gas piping. The simple block test may be taken as an example. Shaped oblong, about 10 inches long, 6 inches high and 6 inches wide, and supposing that we take an iron block weighing 50 pounds.

This block may be placed upon a smooth surface, as in Figure 1. A cord is attached to an eyebolt in one end, by which means the block can be drawn over the board by applying a certain amount of force. If the force were applied with the block in direct contact with the wood the friction would be so great that considerable force would be required to remove it. If oil or grease were previously applied to the surfaces, the film formations would permit the block to move with much less force. What we must get at is the co-efficient of friction. If it requires a force equal to 25 pounds to move this 50-pound block over the oiled board, the co-efficient would be .50. If certain other oils or greases could be applied to the surfaces in such a way as to make it possible to move the block with a force of but 10 pounds, then the co-efficient would be .20. Multiplying the weight by the co-efficient gives the force required to overcome the friction. The lower we can get the co-efficient of friction by means of lubricants, the less the force required to operate and the less the friction. In gas pipe connections the friction of the threads and the pressure against the beveled sides of the thread keep the sections together. The constant jarring to which nuts and threaded work on gas pipes are subjected tends to work them loose unless means are provided for preventing. Lock nuts, double nuts and various patented devices are utilized, and yet nuts and unions loosen at times.

Take a threaded nut and bolt of the right threaded pattern and hold it horizontally, as in Fig. 2, and if you rap the bolt with a hammer the jar will cause the nut to turn a little to the right with each rap. Similar action occurs on a left handed bolt, except that the nut moves to the left and will finally drop off, if not prevented. This tendency is of course overcome by making the nut bind against something; *i. e.*, by using lock nuts or special attachments. Of itself, a nut will seldom work tight, for the beveled threads of the right cut bolt tend to move the nut off to the right, and left cut off to the left, by gradually turning the nut at each mechanical motion, unless, as before stated, the nut is secured by frictional contact or special attachments. The lock nut is a good remedy. Some gas pipe fitters put the lock nut on the top, which is not correct, as this nut contains but two or three threads. The right place for it is at the bottom, next the washer, where there is practically no strain on the threads, but where the thin nut prevents the larger nut from turning.

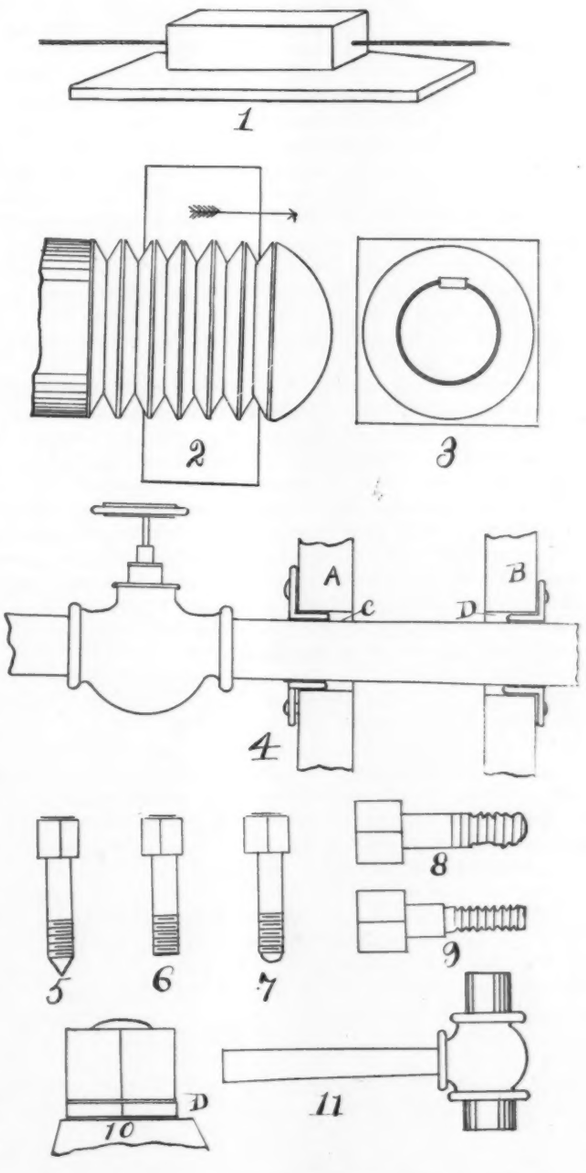
In Fig. 3 is shown the key or pin method, which is used frequently, and consists in boring or cutting a groove in the threads of nut and bolt to receive the locking key as shown.

Incrustation and Scale.—Nearly all waters contain foreign substances in greater or less degree, and though this may be a small amount in each gallon, it becomes of importance where large quantities are passed over gas pipes situated between two walls, *A* and *B*, as in Fig. 4. The cut shows the situation of a recent case which came to notice in a manufacturing plant where it is necessary to pass the gas main through masonry containing the water supply to the plant. The foreign stuffs in the water caked in the flanged pipe holes at *C* and *D*, and soon destroyed the pipe metal by eating into it. The nature and hardness of the scale formed of water will depend on the kind of substances held in solution and suspension. Analyses of a great variety of incrustations show that carbonate and sulphate of lime form the larger part of all ordinary scale; that from carbonate being soft and granular, that from sulphate hard and crystalline. Organic substances in connection with carbonate of lime will also make a hard and troublesome scale. The presence of scale or sediment in or about gas pipes results in the cracking of the pipes, predisposes to fracture, and leads to extensive repairs. The most common and important minerals in scale are carbonate of lime, sulphate of lime and carbonate of magnesia. Small amounts of alumina and silica are sometimes found, and an oxide of iron not infrequently is present as a coloring matter.

Means of Prevention.—If the pipes must be passed through water an extra casing should be provided, and the casing should be metal, fitted with flanges to close the ends tight and prevent water and moisture from getting into contact with the pipes. Pipes should be constructed of good material, correctly sized and fitted with elbows and unions of proper dimensions. The resistance of an elbow is equal to ¾ that of a globe valve. These equivalents, for opening, for elbows and for valves, must be added in each instance to the actual length of pipe. Thus a 4-inch pipe, 120 diameters (40 feet long), with a globe valve and three elbows, should be equivalent to 120 by 60 by 60 by (3 by 40) = 360 diameters long; and 360 ÷ 240 = 1½.

Set Screws.—Pressure often causes a set screw to cut a groove in a gas pipe. It will not do to remedy this with a sharp pointed set screw, like Fig. 5; for this will cut the pipe still more, nor will a flat point, like Fig. 6, do; for this will not grip well and will slip. The medium between the two may be used, as in Fig. 7. Such a point can be screwed firmly to its seat on the pipe and usually hold permanently without causing the pipe to buckle.

Hardening.—In case hardening the gas pipe stock the metal is only hardened on the outside, or to a very trifling extent inwards. This



may be accomplished by rubbing its surface with prussiate of potash while the iron is at a red heat, then quenching it in water. This case-hardening is good in many ways, as for forged wrenches, bolts and nuts; in fact, almost any forging can be treated in this manner. The only portion which becomes hardened is that which comes in contact with the potash. The harder cast irons are used only for conversion into wrought iron and steel, the softer ones being used for other purposes. Wrought iron may be considered as cast iron from which the greater part of the carbon has been eliminated by a process called puddling. It is a silvery metal, moderately hard, and very strong and tough; it contains very little, if any carbon, and can be welded at red heat. Wrought iron may be case-hardened by practically converting its surface into steel.

Cutting Threads on Gas Pipes.—Cutting screw threads in an engine lathe generally takes up all the attention of a gas pipe fitter, as the

shipper must be thrown off at the right instant, the cross feed turned back a revolution just as the reversing of motion takes place, and the depth of cut regulated while the lathe is in motion. Knockouts are to be seen quite often for stopping the lathe at any desired position which could easily be applied to the screw feed in such a way as to reverse the motion of the lathe. This, with a throw-back cam for the cross feed that would draw the tool from the work just as the shipping of the lathe was to take place, would leave the thread cutting process almost automatic. At one time this thread cutting operation was attempted by hitching a weight over a pulley to draw the lathe carriage back where the screw feed was unlocked and allowed to be thrown into gear again on the return stroke. The cross-feed screw was managed about the same way, by a weight suspended from the hub of the hand wheel. With two stops, one for drawing back the tool and the other for unlocking the screw-feed nut, this arrangement is much hindered.

Keeping Worn Screws in Service.—There are numbers of sizes and kinds of cap, box and set screws in use on gas piping, and some of these screws are hard to replace when once destroyed. Suppose that a screw is broken or worn down at the threads, as in Fig. 8. Such a screw is useless in its present condition, and a pipe system may be standing idle for lack of a new screw to replace the defective one. In such a case as this it is a good plan to put the screw in a turning lathe, turn off the broken thread and cut on a new thread, as in Fig. 9.

Double Nut.—The two, or double nut method, as used by gas engineers, is shown in Fig. 10, in which the system differs from the old style in that the first nut, *D*, is very thin as compared with the top nut. The system will be found as effective as if the lower nut were also large and bulky.

Tools.—There is much clipping of metals to be done in all gas piping shops, and hammers of proper weight and proportions should be provided. Fig. 11 is a 1¼-pound head, for chipping on soft metals. It is provided with a head made with lead hardened with tin, and put into the channel as shown. Stiff blows may be struck the cold chisel with this hammer, and the elasticity of the hardened lead will soften the stroke. The pattern of chisel with which the best work may be done is a perfectly straight one. Curved chipping chisels are not a success. The first bevels of the chisel should be alike on both sides, and the second or ground bevels should also be alike. With a chisel of this form, well tempered and ground, and the hammer described, a good job of chipping may be done on gas metal.

Leaks.—Since the advent of thin lead, cement and similar linings have come into use, for the pipes must be tight. Nothing else will answer, for the lining is merely a pressure-resisting coating. If there be a leak in the pipe the working pressure is at once put upon the lining, whereas if the pipe is tight the lining is not subjected to any considerable pressure. It is in equilibrium, so to speak; just as if a pail were put into a boiler, there would be no internal pressure in the pail, because the outside is as great as the inside pressure, but put the pail against the steam outlet and there is a different story to tell. The pipe opening acts the same as a leak in the shell, consequently the pail has to stand the full internal pressure or burst. Another good illustration is to blow up a bladder inside a glass bottle. The bladder will fit itself tightly to the bottle, and all the air pressure possible will not burst the bladder or bottle lining; but try the same thing in a basket, or a tin can or pail in which a hole has been made. It does not take long to burn a hole in the bladder right over the spot where the hole is in the pail or can.

A Cracked Pipe.—The gas pipe fitter is sometimes required to repair a cracked pipe temporarily. Recently a pipe was cracked and it was kept tight for a time with a simple wrought iron clamp which the blacksmith forged out to the diameter of the pipe and bored for four bolts in the flanges. The bolts were drawn up so tight that the crack in the pipe was effectually closed and the leak stopped.

[From the *Journal of Gas Lighting.*]

Coke Handling Plant.

[A paper prepared for the last meeting of the Institution of Gas Engineers, by MR. T. HOLGATE, Halifax, England.]

The author has had occasion to consider the suitability of various forms of machinery for dealing with the coke from an existing retort house, and also from one now in course of erection at Halifax; and hopes that a record of his experience and of the information thus compiled may prove the basis of a useful discussion. The subject is taken to include the quenching, the conveyance from the mouths of the retorts, the screening, sizing, washing, storing and delivery to consumers; and the author proposes to refer to the features which present themselves under these several headings, and consider how the various forms of plant meet the necessities in each case.

Quenching.—If coke is removed by side-tipping wagons, then a good supply of water is needed, as well as a distributer which will deliver a fairly equal shower of water over the area of the wagon. Unless this is the case, some of the coke will be insufficiently cooled, while other portions will be exceedingly wet. In one case, where these trucks were in use (presumably holding about 10 cwt. of coke), the engineer informed the author that their use was being discontinued on account of this difficulty. In my own experience of trucks holding 6 cwt. of coke, the equal cooling of it has not been found easy. At Halifax the coke is received from the horizontal retorts into a hopper having its mouth at the retort house floor level, and having at the bottom a door. If the coke man has an insufficient supply of trucks, he receives the coke into the hopper; otherwise he allows the coke to slide through the hopper into the truck, and quenches there. If the operation is not well done by the first named method, then distortion of the hopper door takes place; and in either case a good supply of water is necessary; the advantages being in favor of quenching in the truck. The efficiency of quenching in conveyors appears to be much better in the scraper form than in the plate. In the latter the water escapes below the plate, while in the former it is retained in the trough in contact with the coke. Where all the coke is passed through screens, it appears that less water need be used than when it is delivered without such an intermediary.

Conveying from the Retorts.—The most suitable method for each case must depend primarily upon the relation in position, level and area of the coke yard to the retort house.

The following are to a larger or smaller extent in use:

(A) Removal by means of trucks worked by an endless rope, locomotive, horses, etc., upon gauges from 2 feet to 4 feet 8½ inches.

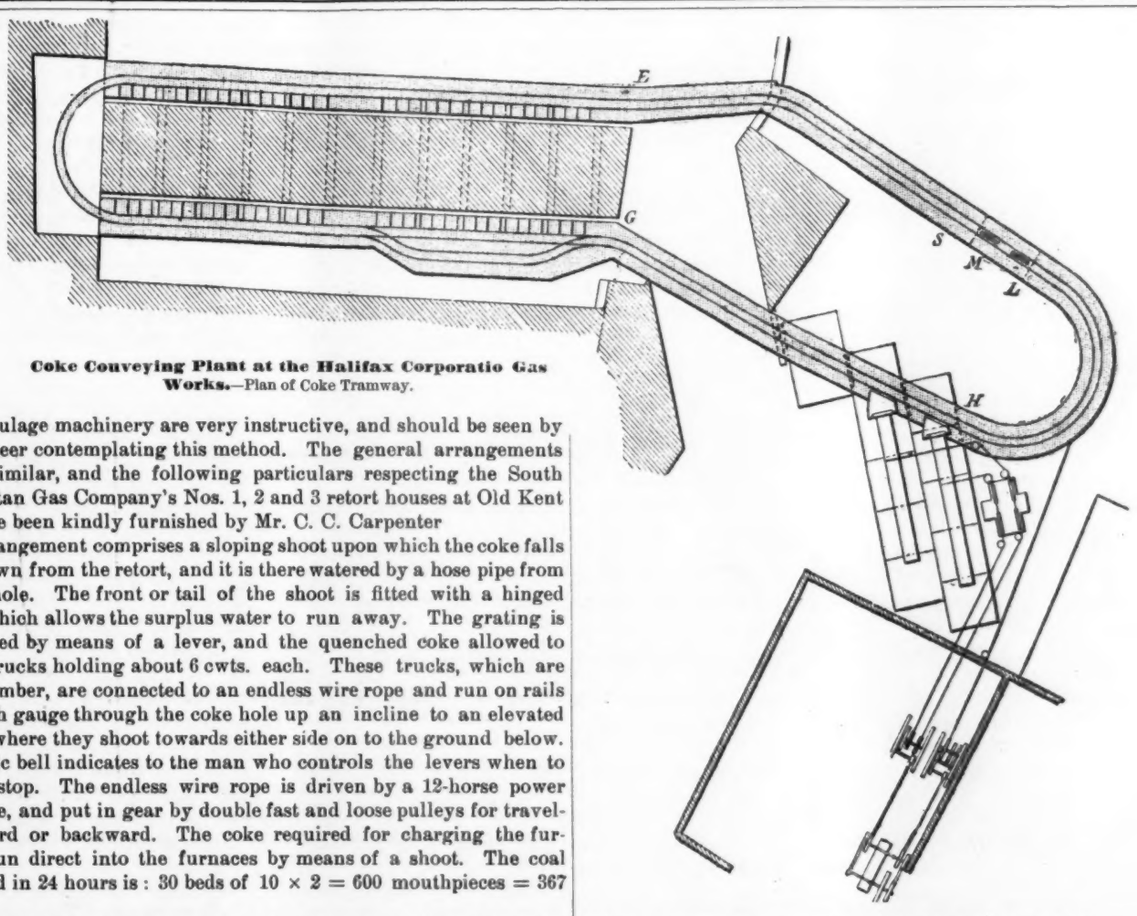
(B) Removal by means of conveyors.

(C) Combinations of A or B with means of elevating—(*e.g.*) inclined conveyors, bucket elevators, crane lifting by grab or bucket.

Method A has been adopted at Halifax (see pp. 885–86) for dealing with the coke from 180 mouthpieces, and was selected because of the contiguity of the railway viaduct to the retort house preventing the use of conveyors which must run in straight lines. The use of a wire rope gives elasticity in plan as well as in elevation to a greater degree than would the use of locomotives, with the advantage of a lighter set of girders and standards to support the tramway. The haulage rope is ⅝-inch diameter, 300 yards long, and runs at ¾ mile per hour. The tension is maintained by a weight of 6 cwt. suspended from a pulley 4 feet 6 inches diameter (over all). The power is obtained from a shaft in the adjacent workshop, and the driving pulley draws the rope from under the tramway through guide pulleys. The pulleys and rollers are of cast steel, selected from the catalogue of Hadfield's Steel Foundry Company, Limited. The rope travels from *G* to *L*, through the tension gear (placed under the tramway) and from *L* to the driving pulley, and from that back to *M*, and thence to *E*, completing the circuit to *G*, as shown on the block plan. It will be noticed that at *L* the trucks must be disconnected, and at *M* reconnected to the haulage rope. From *G* to *H* the ascent is 1 in 14, from *H* to *S* level; and from *S* to *E* the descent is 1 in 12.63. For safety, the inclined portions of the tramway are fitted on the ascent with automatic stops at 6-feet centers, to prevent trucks running away; and on the descent a brake in the form of a long flat bar 2 inches by ¼ inch, standing 6 inches above the tramway, is required.

The trucks used weigh about 7¾ cwt. The frame is 5 feet 6 inches long, the body 3 feet 6 inches long by 3 feet 9 inches broad at top and 2 feet 4 inches deep. The carrying capacity is 20 cubic feet, equal to 6 cwts. of coke. The trucks are connected in pairs by a piece of chain, the front one is secured by a clip to the wire rope. It has been designed and made as the result of many tests and to meet the trying conditions of this installation. The clip must be easy of attachment to the rope, it must hold firmly in ascending and descending inclines, it must pass easily the guide pulleys on the tramway, and it must by its method of connection to the truck not allow the latter to overrun the clip when descending. It must also be arranged to release automatically when the truck reaches the screens or the place *L* where the rope passes under the tramway. By fixing at these points a 1½-inch diameter horizontal bar 3 feet 9 inches long at 9½ inches above the tramway this is satisfactorily done. The adhesion of clip to rope is diminished as the latter wears away, and to compensate for this, in the Halifax clip, the wedge action is provided with an adjustable slide, and for still further wear the jaws of the clip have renewable bushes.

The installations at Old Kent Road and the Crystal Palace gas works



Coke Conveying Plant at the Halifax Corporatio Gas Works.—Plan of Coke Tramway.

of rope haulage machinery are very instructive, and should be seen by any engineer contemplating this method. The general arrangements are very similar, and the following particulars respecting the South Metropolitan Gas Company's Nos. 1, 2 and 3 retort houses at Old Kent Road have been kindly furnished by Mr. C. C. Carpenter

The arrangement comprises a sloping shoot upon which the coke falls when drawn from the retort, and it is there watered by a hose pipe from the coke hole. The front or tail of the shoot is fitted with a hinged grating which allows the surplus water to run away. The grating is then opened by means of a lever, and the quenched coke allowed to fall into trucks holding about 6 cwts. each. These trucks, which are five in number, are connected to an endless wire rope and run on rails of 14½-inch gauge through the coke hole up an incline to an elevated railway, where they shoot towards either side on to the ground below. An electric bell indicates to the man who controls the levers when to start and stop. The endless wire rope is driven by a 12-horse power gas engine, and put in gear by double fast and loose pulleys for traveling forward or backward. The coke required for charging the furnaces is run direct into the furnaces by means of a shoot. The coal carbonized in 24 hours is: 30 beds of 10 × 2 = 600 mouthpieces = 367 tons.

The cost of labor is 4.3d. per ton of coal carbonized, and includes quenching and delivering the coke upon a heap 10 to 18 feet high by 172 feet long, the coke being drawn from each side of retort benches 313 feet long. At Halifax, the cost in wages for quenching, removing to store heap, or screening into hoppers, is equal to 4d. per ton of coal carbonized. The retorts number 10 beds of throughs, 9 in each arch; that is, 180 mouthpieces with 6-hour charges.

The points to be emphasized in connection with rope haulage are as follows:

1. The adoption of a convenient method of automatically tightening the rope.

2. The use of curves upon the tramway and rope circuit of the largest possible radius. At Halifax, the minimum radius is 15 feet, and upon this part the guide pulleys are required at 1 foot 3 inches center.

3. The use of fleeting and guide pulleys of large diameter, and where grooved, those grooves to be turned in a lathe to the exact curvature of the circumference of the rope.

4. The life of the rope depends upon the maintenance of the splice, and this in turn depends upon the flexibility of the rope, the angle through which it is bent on its circuit, and the number of times per hour that angle is reproduced.

5. The use of a screen which is effective in dealing with large quantities of coke received irregularly.

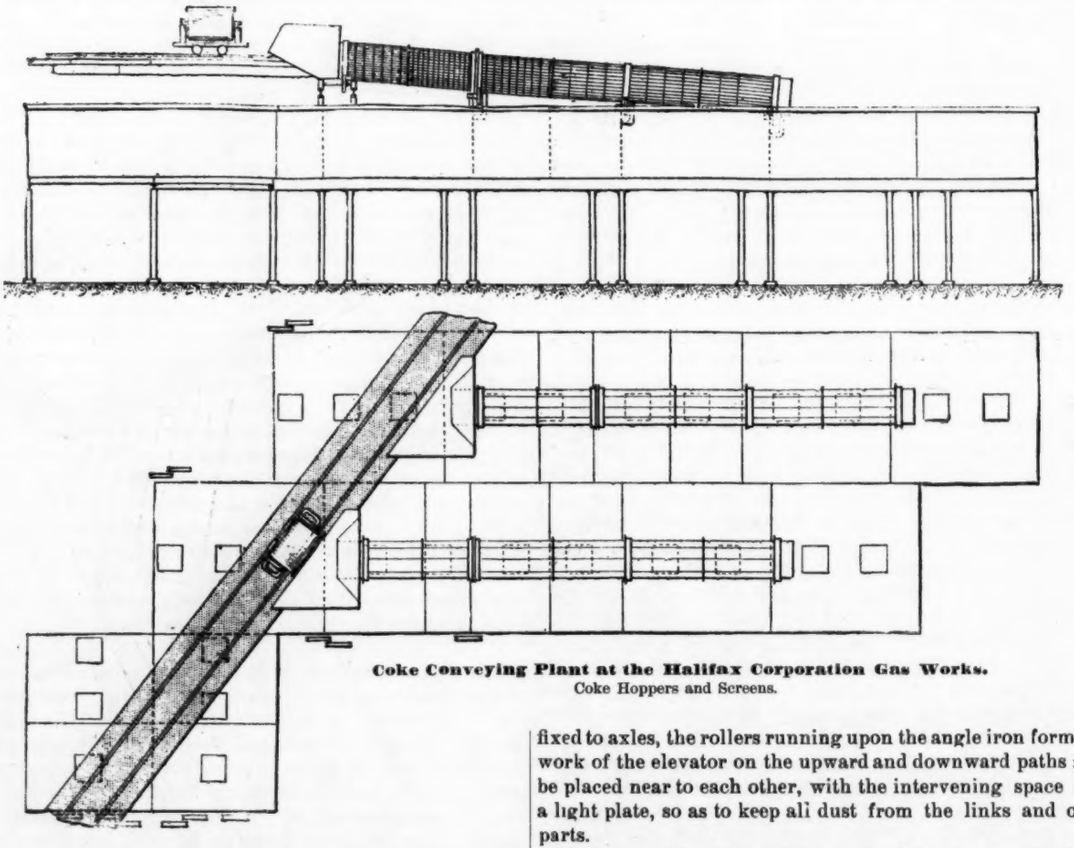
Where coke is delivered nearly dry and in a fairly continuous stream, the screening operation is simplified, but where trucks are used a very efficient screen is necessary. This point will reappear under the head of screening. The use of locomotives for removing the coke in trucks on a 4 feet 8½ inch gauge has, to my knowledge, been used with success in one gasworks, but has since been replaced by conveyors and elevators. With a gauge of 2 feet it is, I believe, in use at the South Metropolitan gas works, Old Kent Road and Vauxhall, also at Dawsholm works, Glasgow. The absence of wire rope is an advantage, but on the other hand, good curves and easy gradients are a necessity. Where these can be obtained with a double line of rails from the coke vault to the various parts of the coke yard the system appears to work well.

Method A.—Removal by conveyors has in many cases not been wholly satisfactory, on account of the high cost in maintenance, although the saving in labor charges has more than justified the capital outlay. Again, the necessity of working in straight lines and the inflexibility of the arrangement have also retarded their adoption. It is claimed by the makers of one kind of conveyor that will be hereinafter described, that a slow curve can be traversed, because the path is described by rollers placed outside the trough; and, further, by the use at the terminals of the conveyor of a rotary section, the flexibility is greatly increased. The cost in wages appears to be less with a good conveyor than with trucks, buckets, or grabs.

Pan or plate conveyors, however suitable for dealing with coal, are not so for hot coke. The presence of tar, of coke grit, of water for quenching, all conspire against the durability of the plates, the chains, the bearings, sprocket wheels, or other moving parts; and to overcome these adverse elements, the thickness of material has to be increased, with the result that the power required has been unduly augmented. The wear and tear on plates, chains, and pins for same have received attention, so that quite a number of varieties in the unit of construction are available.

The place where the hot coke conveyor is most efficient appears to be with its upper surface level with the retort house floor; but there are varying conditions, such as the presence of furnace shoots, which may require the conveyor to be placed under the floor with light shoots directing the coke thereto. In Mr. Wild's conveyor this use of the shoots enables the rollers and other wearing parts to be kept out of contact with the hot coke, water, or tar. The return chain is now often placed above the highest tier of retorts, supported by rollers on a series of brackets and tie rods, in this way giving an easy curve for the change of direction at each end, and also keeping the chain comparatively dry. This method may be replaced by an under return chain supported on a path supported by the same frame as the conveyor trough; in some cases on the Continent the return chain of the De Brouwer conveyor has been used to take ashes and clinker from the furnaces and deposit them in an elevated bunker. In most of the push plate conveyors the scraper does not bear upon the trough, and this secures quiet working with the wear due to weight only acting upon the rollers or sliding contacts. It is very noticeable, when watching these conveyors, that the coke is taken bodily forward without much distribution, but, being of a relatively small depth, every part may be quenched by the water sprays placed at intervals over the trough.

Elevating.—The makers of the De Brouwer conveyor state that in Belgium their appliances are effective in carrying coke up inclines of



Coke Conveying Plant at the Halifax Corporation Gas Works.
Coke Hoppers and Screens.

30°, and that, if found necessary, this angle could be increased somewhat before the coke would cease to be carried forward. Mr. Wild, by using a deep scraper, claims to lift up slopes of 45°. This method of elevating is very convenient, owing to the absence of difficulties in feeding; the discharge may also be made at any part of the height. The dead weight moved is small, and the wear and tear should not prove expensive.

Bucket elevators have the advantage over cranes in giving more continuous delivery, resulting in less cost for labor especially where the point of delivery is constant. It is necessary that the feeding arrangements at boot, or better into the buckets, should be good. The chain to which the buckets are attached must be of uniform pitch, must not wear or stretch unduly, must have pins and bushes that can readily be renewed, or be so hard as to wear out but slowly. The weight of the buckets, the chain and the coke, with the inclination, will determine the stress to be borne by each link, and in choosing the type a material of uniform strength should be found. The chain, perhaps, most extensively used hitherto has been Ley's bushed chain, made of "black heart" malleable cast iron, and having a safe working strength of 2,500 pounds for the 6 inch pitch, pattern No. 600, which the makers state is about one-tenth of the breaking strength. The wear of this chain is stated to be very much less when the material employed is Hadfield's manganese cast steel links, fitted with forged manganese steel pins. The wear of the sprocket wheels is very much reduced by the fixing of a roller dpon the pin joining the links, as devised by our past president, Mr. Charles Hunt.

It would appear that the ultimate tensile strength of manganese steel is twice that of malleable cast iron, but the elastic limit of the former is comparatively low. It would not, therefore, be advisable to reduce the sectional area (irrespective of the difficulties in casting of steel) of the manganese steel links, as a permanent set would be induced, such as to cause a jerky action at the sprocket wheel.

For any important installation of elevators it would be desirable to have the links proposed to be employed tested, and only use them for stresses well within the elastic limit. It is further desirable to remember that manganese steel is not recommended by its makers for use where the links are liable to become heated, as the strength rapidly diminishes as the temperature is raised.

Elevators are best driven from the top with a belt, so that in case of unusual strain, slipping may take place rather than breakage. Buckets used for coke should have strengthened lips; they should have rollers fixed to axles, the rollers running upon the angle iron forming the frame work of the elevator on the upward and downward paths; they should be placed near to each other, with the intervening space covered with a light plate, so as to keep all dust from the links and other moving parts.

The shape of buckets and the angle of the elevator should be arranged to give a clean discharge without further devices. The capacity of the elevator must be quite equal to what the conveyor feeding it can ever bring to it, otherwise serious trouble from jamming in the boot may result, and, again, the conveyor at the discharge end of the elevator must be quite equal to the work assigned to it. These conditions must, of course, be designed to suit the conditions of discharging from the retorts, which might be almost continuous or very intermittent.

In a number of gas works the coke is elevated in grabs or in large skips fitted with automatic doors, raised by means of cranes of various types. In some cases, a locomotive steam crane travels upon an elevated railway, preferably of a wide gauge (up to 8 feet); the crane has motions which enable it to cover a series of circles sufficient to load into hoppers, into screens, or go to the store heap as desired. Where the grab is used it would appear that some breakage of the coke will take place in filling. An instance of a recent installation of a traveling crane upon an elevated railway, lifting a large bucket out of a pit, to serve screens and thence into hoppers, is that of the Higginshaw (Oldham) Gas Works, under Mr. Chadwick. An extension of this method has been devised and patented by Mr. Woodward, of Manchester. He places a crane upon a frame or carriage, which carriage rotates upon a path of girders. The crane can also rotate upon the carriage, and the combination of movements enables a large area of ground to be covered to a considerable height with coke, or hoppers may be used, from which carts or bags may be filled.

As an instance of the cost of providing a steam crane for dealing with 60 tons of coke per hour, the following particulars will serve: The crane jib describes a complete circle of 120 feet diameter, maximum rake 120 feet, minimum rake 32 feet. Weight of coke lifted each time 3 tons. Coke skips 290 cubic feet capacity, with hinged bottom doors (price about £30). Total weight of crane 30 tons; ballast 12 tons. Approximate price excluding foundations and steam supply from works boilers £1,000.

Perhaps the most suitable form of crane is the cantilever, as employed by Mr. H. Hack at Saltley Gas Works. Coke from the terminus of the pan conveyor falls into a bucket placed in a pit; the bucket holds 2 tons, and is lifted by hydraulic power, traversed along the cantilever or rotated so as to be deposited at the store heap, into screens for boats, for railway trucks, or for other receptacles for yard sale.

Screening.—The form of screen most suitable appears to depend upon the number of sizes of coke required, the height and length available,

the intermittent or continuous stream of material, and the arrangements at the boppers or other receptacles. It is to fixed screens driven by power that the following remarks are intended to apply.

Where shaking screens are used, as, for instance, at the Gaythorn Gas Works and at many collieries, flat plates with round holes closely spaced appear to be effective, furnishing a nut or cobble of very uniform cubical content. The flat plates are placed at a slight inclination, and the forward movement of the coal or coke, and the removal of the dust, are obtained by a reciprecating motion which is quick in a forward direction and slow in returning.

Another form of inclined screen is in use at the Saltley Gas Works. The coke is traversed by a number of chains placed in parallel lines, and the spaces over which the coke is thus brought are made wider or narrower according to the width of the bars placed between the adjacent chains.

Rotary screens appear to have the advantage in simplicity of their moving parts, and in general arrangement are capable of considerable modification to suit individual requirements. For coal, the Humboldt Engineering Company, Limited, use a number of cylinders (as many as five) placed concentrically ; the spaces between each adjacent cylinder being occupied by spirals which deliver the various sizes into shoots. In this way the largest material is first removed, preserving it from breakage. One of these compound screens, to deal with 100 tons of coal per hour, weighs 11½ tons, and measures 8 feet 3 inches in length by 10 feet 6 inches diameter. Similar rotary screens, but without the spirals referred to, are made by many colliery engineers, and to some extent they are used in gas works for removing dust and for sorting breeze. They appear to be effective; but where coke is the material screened, and the wear and tear great, the complexity of numerous concentric cylinders is a disadvantage.

Where coke is supplied dry and in regular quantities, a plate periphery with round holes will be effective. But if these conditions do not obtain, the wirework periphery with square or oblong holes will be more effective in removing the dust and small sizes ; and better still, if very exact sizing is not required, is a periphery built up of round bars secured to a framework in such a way as to be easily renewed. The method of driving may be by internal shaft, or better by external spur wheel and pinion, or by wire rope, chain, belt, etc. The screen should be balanced, and the cast iron parts rotating upon the supporting cast steel should be turned up true.

To ascertain the relative efficiencies of two types of screens when fed by coke from trucks holding 6 cwt., the following tests were made at the Halifax gas works :

(1) Screen with plate periphery 34 feet 3 inches long by 2 feet 9 inches in diameter, inclination 1 in 8½. Speed, 24 revolutions per minute.

	Length of Plates. Feet.	Inches.	Passed Through. Per Cent.	
½-inch holes at 1½-inch centers	9	0	2.5	dust.
1 " 2 "	10	3	16.1	nearly all dust.
1½ " 3 "	10	3	16.4	containing 16 per cent. small.
Through end of screen			65.0	not free from dust.
			100.0	

(2) Screen with strong wirework and spaces formed by round bars ; inclination, 1 in 15 ; speed, 24 revolutions per minute ; 23 feet 3 inches long by 2 feet 9 inches diameter.

	Length of Section. Feet.	Inches.	Passed Through. Per Cent.	
½-inch bars and ½ inch spaces	4	7	26.0	dust.
1 1/16 " by 1½-inch mesh	4	7	18.0	of which 6 per cent. was small.
1¾ " spaces	5	4	30.8	clean.
2¼ " spaces	5	4	20.5	clean.
Through end of screen			4.7	clean.
			100.0	

The screen adopted at Halifax is 2 feet 9 inches diameter by 35 feet long, and is driven by means of a ½-inch rope at 17 revolutions per minute. It is supported upon four pairs of cast steel rollers, 14 inches diameter, placed one pair nearly at each extremity, and the others at distances of 10 feet 6 inches apart. The framework consists of four cast iron rings 5 inches wide by about 3 feet 4 inches diameter outside, which rotate upon the aforesaid rollers; and in the second one is combined the fleeting pulley upon which the wire rope is placed. Intermediate to these castings are cast steel rings, 1 inch thick, 2 feet 6 inches inside diameter, and 3 feet 4½ inches outside diameter. Connecting each of these rings with its adjacent casting are placed eight 1¼ inch wrought iron rods with shoulders upon each screwed 1¼-inch Whitworth thread. The cast iron rings, the steel rings and the rods are all machined in the lathe to exact dimensions, and when screwed up form a true circle, balanced, and rotating with the minimum of power. The spaces between each ring (approximately 5 feet long) are filled in with the renewable bars or wirework mesh as desired. The square mesh gives more exact sizes, but the wire is not so durable as the bars.

Section No. 1 is fitted with ⅜-inch round bars with ⅜ inch spaces in segments such that eight make up the circumference. These segments are each secured by three ½-inch bolts to the rings, and thus are easily replaced. Section No. 2 has wirework mesh of ¾ inch square. The wire used is No. 7, 0.176 inch diameter. This mesh is fitted inside the framework, and is likewise easily renewed. Section No 3 is like No. 2, but the mesh is 1¼ inch square, made of No. 4 wire, 0.232 inch diameter. Section No. 4 is like No. 1, but the round bars are ½ inch, and the spaces 1¼ inches. Section No. 5 is also like No. 1, but the round bars are ½ inch and the spaces 1½ inches. Section No. 6 is like No. 1, but the round bars are ½ inch, and the spaces 1¾ inches.

Sizing.—In some localities coke of small but uniform dimensions is much sought after, and it appears that this may usually be met by screening without the intermediary of a breaker. Whether the cubes so obtained by sorting only are as good fuel as those obtained by breaking the larger pieces, the author is unable to say, but they can be obtained more cheaply, accompanied by a lessened production of dust. If coke is to be washed, it is advantageous to have it prepared to uniform sizes ; this is very marked in the washers having mechanical pulsations. Coke from retorts charged with coal, mechanically broken, to be handled by West's manual machine, was passed through a screen as last described with the following results :

	Per Cent.	
Passed through ⅜-inch spaces	13.85	shale, dust and smalls.
" ¾ " square mesh	8.30	containing 30 per cent. under 7/16 inch square.
" 1¼ " "	15.39	free from dust.
" 1½ " spaces	24.00	"
" 1½ " "	12.00	"
" 1¾ " "	11.08	"
Over end of screen	15.38	"
	100.00	

Washing.—The preparation of small sizes of coke for smiths' fires is work that is well worth doing, but it requires careful attention to detail. Washing by hand riddle seems to be the method adopted in gas works, but it does not appear impossible to devise a machine which shall do this work efficiently and at small cost for labor and maintenance. The price of washed coke should, however, always be considerably higher than the unwashed material—not less than 50 per cent.—as the proportion of inferior material removed is often high, and this portion may have but a small commercial value. Hand washing is stated to cost 2s. per ton in labor and incidentals.

For mechanical arrangements in washing, the author has endeavored to learn the experience of those who have dealt with coal upon a large scale, and the following is the information thus gained : In England quite a variety of forms exist, many of native origin, and two that are well known (the Luhrig and Humboldt) are of Continental growth. The distinguishing feature of the two last named is the use of felspar as the medium of separating the heavy parts from the lighter ones in a bash or jigger. This vessel receives coal (of uniform dimension from screens) and water. By the oscillation of a piston acting upon the stream of water in which the coal is flowing over a bed of felspar, the dirt passes through the latter and is automatically removed, whilst the coal is elevated into bunkers for drying and loading. The felspar is intermediate in gravity between the good coal and the dirt, and such is the efficiency of the system that the makers of the plant undertake to remove all free ash not exceeding 1 per cent., and to leave not more than 1 per cent. of coal in the dirt they remove, and to do this at a cost of not exceeding 1d. per ton for labor, or 3d. per ton, all charges, including that of interest on capital.

The washer which has been recommended to the author by a number of colliery engineers of experience is that known by the name of Mr. Robinson, of Messrs. Bolckow, Vaughan & Company's works. It has a great advantage in being able to take coal or coke of all sizes at one operation, and the sizing or screening may be done after washing if desired. In comparison with the " Felspar " system the plant required is less costly, occupies less space, and settling tanks for the foul water are not required. The water is used over and over again, and the cost of

circulating the same is not great. The makers claim to treat 400 tons per day of 10 hours at a cost of ¼d. per ton for labor, and at a cost of 1¼d. per ton, all charges and interest included.

For 10 tons per hour a conical vessel 5 feet deep and 6 feet diameter at its upper surface is required. The coal or coke is delivered by shoot into the center of an inverted cone, whilst the water enters under pressure at the lower portion; the mingled water and good fuel pass out by an annular space into the drainage shoot where the good material is collected into a raised bunker, whilst the water flows to a pump used underneath for re-circulation. The heavy parts collect at the bottom and are withdrawn into a bunker by opening a pair of sliding doors at intervals. This latter operation could, of course, be made continuous and automatic if so desired. The mingling of water is rendered complete by the uprush from the point of entry, and by an agitator placed vertically, and which also keeps loose the dirt which accumulates. When inspected by the author at the Lofthouse Colliery the working appeared quite satisfactory, and he has now arranged for a quantity of gas coke of mixed sizes to be washed and afterwards screened. The gravity and percentage of ash will be determined for each size of the washed material and residue.

The Wood and Burnett coal washer is a belt traveling along an inclined trough down which water is flowing. The fuel and water enter at the head of the trough; the good stuff being carried by the water to the bottom, while the dirt is carried over the top and is received in a bunker. The good material is allowed to drain over perforated plates, and is then elevated into bunkers, while the water is re-circulated.

The Eliot washer is somewhat similar to the one last mentioned. As installed in the Thornhill Collieries, near Dewsbury, it consists of a pair of inclined troughs (each of which is worked separately), 60 feet long, fitted with close-fitting scrapers. The inclination is about 1 in 10, the trough 20 inches to 10 inches wide and 7½ inches deep, the scrapers 4½ inches deep at 6½-feet centers on a conveyor chain. The water enters at the head of the troughs, and the coal midway. The good material passes out at the bottom and the dirt at the top. The Joslin's patent washer is arranged to separate coke from inferior material by scraping from near the surface of the water all that floats there. To carry this method into effect an oblong vessel is employed, fitted with an inclined plane, which, starting below the water line, emerges above the vessel, so as to allow of the drainage of the coke removed by a series of scrapers. The scrapers are perforated, and are secured by hinges to a conveyor chain working over sprocket wheels, so placed above the vessel that the scrapers dip into the water where the supply of coke enters, and emerge from the water to carry up the inclined plane the lightest and cleanest portion of the coke. These ob long vessels are arranged in pairs, and the precipitated matter is automatically removed from them by a screw conveyor, elevating the same to any height desired out of a channel common to the two vessels before mentioned.

Coke breeze from the Halifax Gas Works has been treated in three of the washers mentioned in this paper with the following results:

Size.	Percentages.		Sp. Gravity.		Ash, per Cent.		User's Report.
	Good.	Residue.	App'rent.	Real.	In Good.	In Residue.	
Through ¼ inch square mesh (*a*)	81	.....	0.451	0.973	8.94	66.86	Very good.
	.....	19	1.003	1.729	.....	.....	
Ditto (*b*)	84	.....	0.472	1.007	12.40	55.04	Moderate.
	.....	16	0.877	1.680	.....	.....	Excellent for use with blast.
Through 1½ inch square mesh (*c*)	58	.....	0.370	0.870	13.30	14.10	
	.....	42	0.540	1.129	.....	.....	
Through ¼ inch square mesh (*e*)	36	.....	0.404	0.844	11.30	23.30	Excellent.
	.....	64	0.593	1.255	.....	.....	
Through ⅝ inch spaces (*c*)	29	.....	0.446	0.862	9.90	28.50	Excellent for light forgings.
	.....	71	0.648	1.265	.....	.....	

(*a*) Treated in the Wood and Burnett washer at South Hetton Colliery.
(*b*) Treated in an Eliot washer at Thornhill Colliery.
(*c*) Treated in an experimental washer at Heenan and Froude's works.

N. B.—The gravity of the coke is affected by its compactness, due to degree of carbonization, etc., as well as to the percentage of ash in its composition.

An examination of the washed coke, and the use of it in a smith's fire, reveals the fact that the lightest only has been removed by the Heenan and Froude's washer, and that the residue is a mixture of refuse with a quantity of coke in which pieces of scale are imbedded. If this residue were treated in a washer in which an uprush of water is maintained, there is no doubt a further separation could be effected, resulting in a second quality of coke with a residue nearly all refuse.

The best all-round results will be obtained by purchasing for carbonizing nothing but washed or hand-picked fuels, and when this is accomplished economically the necessity for coke washing will have diminished. The use of washed coal necessitates precautions to secure freedom from excessive moisture, and this will probably be obtained better by purchasing in the washed state than by carrying out the process at the gas works. Until clean coal can be purchased at an economical rate, washing of the coke will be necessary, and it will be worth considering whether future plants shall be designed to wash the whole or only the smaller cubes.

Storing.—The storing in hoppers provided with doors for discharging the coke into railway trucks, carts, etc., is comparatively a simple matter, if attention be paid to the head room required, the stock of coke to be held in proportion to the retort house production, the quantity of each size of coke that will pass through each grade of the screen, the capacity to be allotted to the washed coke, and the fact that the dropping of the coke must be down shoots to prevent formation of dust. Where only the small cubes are washed, it may be desirable, under certain local conditions, to pass the coke from the screens on to picking belts before depositing in the hoppers, so that the refuse may be removed by hand. Where a large trade is done by retailing in bags, special discharging shoots are advisable for the convenient filling of the bags, and for measuring or weighing the same. The arrangements of Mr. Hunt, at Birmingham, and of Mr. Braidwood, at West Greenwich, are worthy of inspection, and especially in this regard.

Storing of coke in the open (or as at some works in large sheds) may be done in a variety of ways.

(1) By lifting truck by hydraulic hoists from ground level to an overhead railway, commanding at a sufficient elevation the area to be covered, as at Vauxhall.

(2) By crane on elevated railway (as at Dawsholm, Higginshaw, and other works), or by cantilever or jib crane, or by Mr. Woodward's method as described in the earlier parts of the paper.

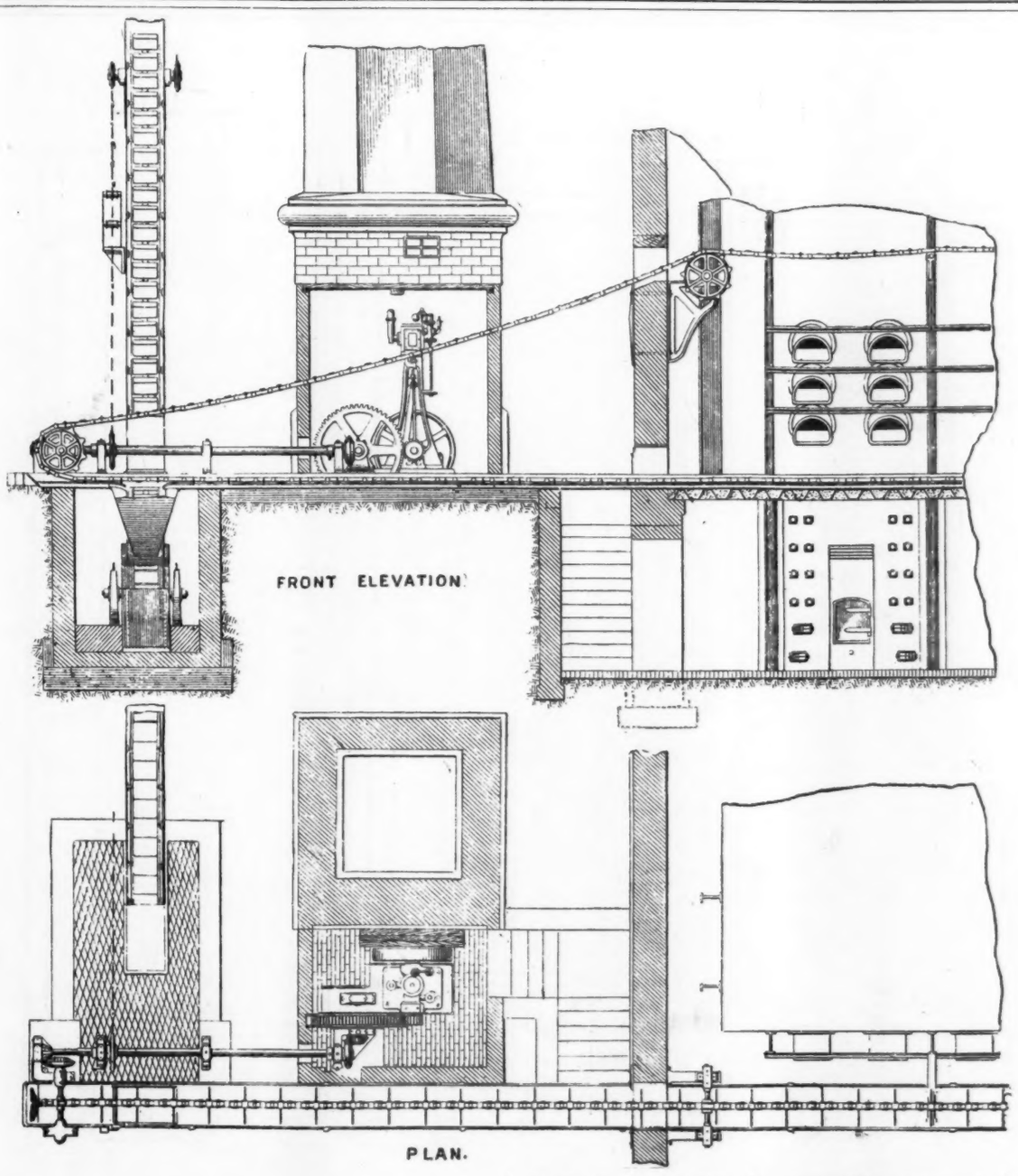
(3) By a combination of conveyor, elevator and traveling conveyor, rectilinear or rotating.

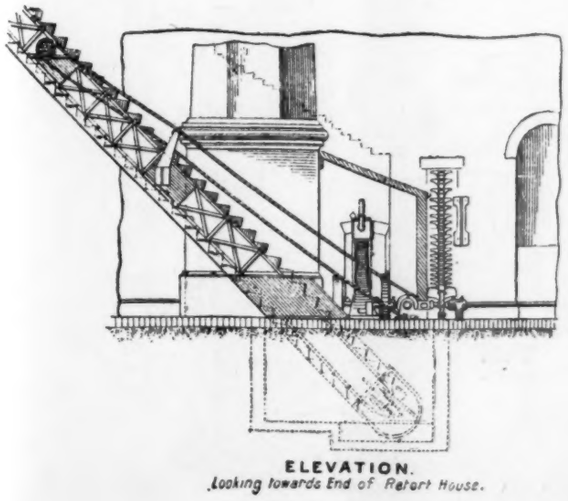
The re-loading and screening of the coke from the store heap is accomplished without extra machinery by the second method, but where large quantities are to be handled under the third, it might be worth using an underground conveyor. The proportion of the year's make that has to be loaded up from the heap need not be great, and under ordinary circumstances would be filled by fork or shovels into carts brought alongside.

The following are combination plants based upon the types before mentioned:

1. *Gaythorn Gas Works, Manchester.*—The retort house is fitted with 18 arches, each containing 6 inclined retorts 20 feet long. The trough is 212 feet long by 27 inches wide by 9 inches deep, fitted with West's conveyor links and scrapers combined therewith at 12-inch centers, traveling at a speed of 54 feet per minute. The wear upon the central path raised in the trough is taken by sliding blocks in the chain, which can be renewed when necessary, and by the table of a T-iron, which is also easily replaced when worn. The upper surface of trough is flush with retort house floor, and the return chain is carried over rollers resting on buckets spaced at 9 to 11 feet centers. Tension gear for adjusting the stretch of chain is provided at the point furthest from the engine and the driving pulleys. The discharge from the conveyor trough is by a shoot directed towards the buckets on the elevator. The buckets are 16 inches wide, of 28 pounds capacity, and each alternate one is fitted with an axle, carrying at its extremities a roller 6 inches diameter bushed with Babbitt's metal. All the principal bearings are lined in the same way and are found to wear less than any other metal, as proved by previous experience at the Windsor Street Gas Works, Birmingham. The links are Hunt's patent at 6-inch pitch, and run at 86 feet per minute. The height of the elevation is vertically 37 feet, on incline 52 feet, and the plant is capable of lifting 60 tons per hour.

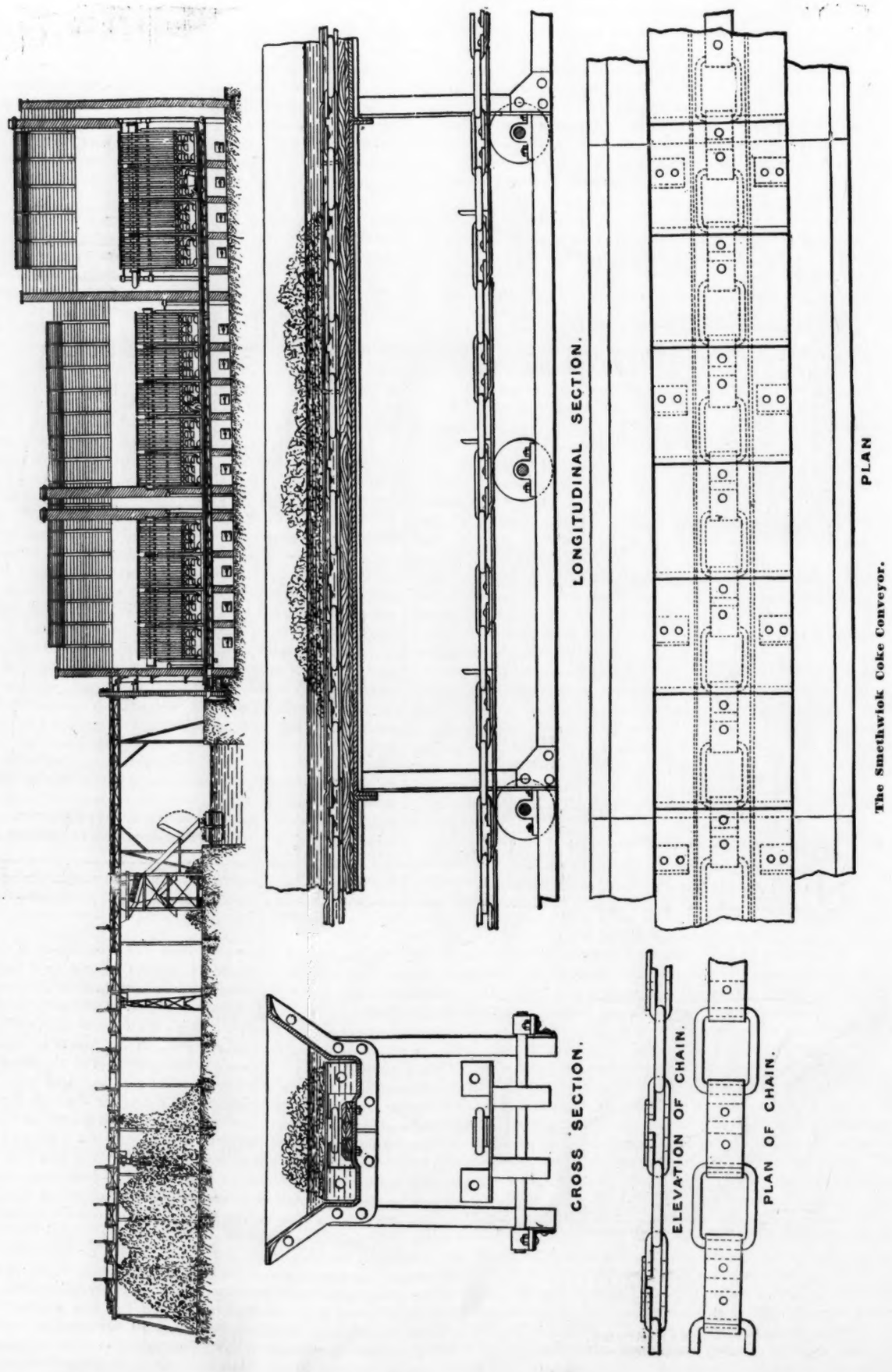
The screen consists of a flat plate 7 feet long by 3 feet 6 inches wide, making 160 vibrations per minute, with a travel of 4 inches, at an inclination of 1 in 6. The orifices are 1½-inch diameter placed at 1¾-inch zigzag pitch. The cold coke conveyor is 167 feet long, with plates 2 feet 4½ inches long by 1 foot wide each unit. The ploughs are at an angle of 60°. The motive power is a vertical steam engine of 11 inches diameter and 12-inch stroke, supplied with steam at 55 pounds pressure per square inch, running at 90 revolutions per minute. The indicated horse power is 20, required for working hot coke conveyor, elevator, screen and cold coke conveyor.



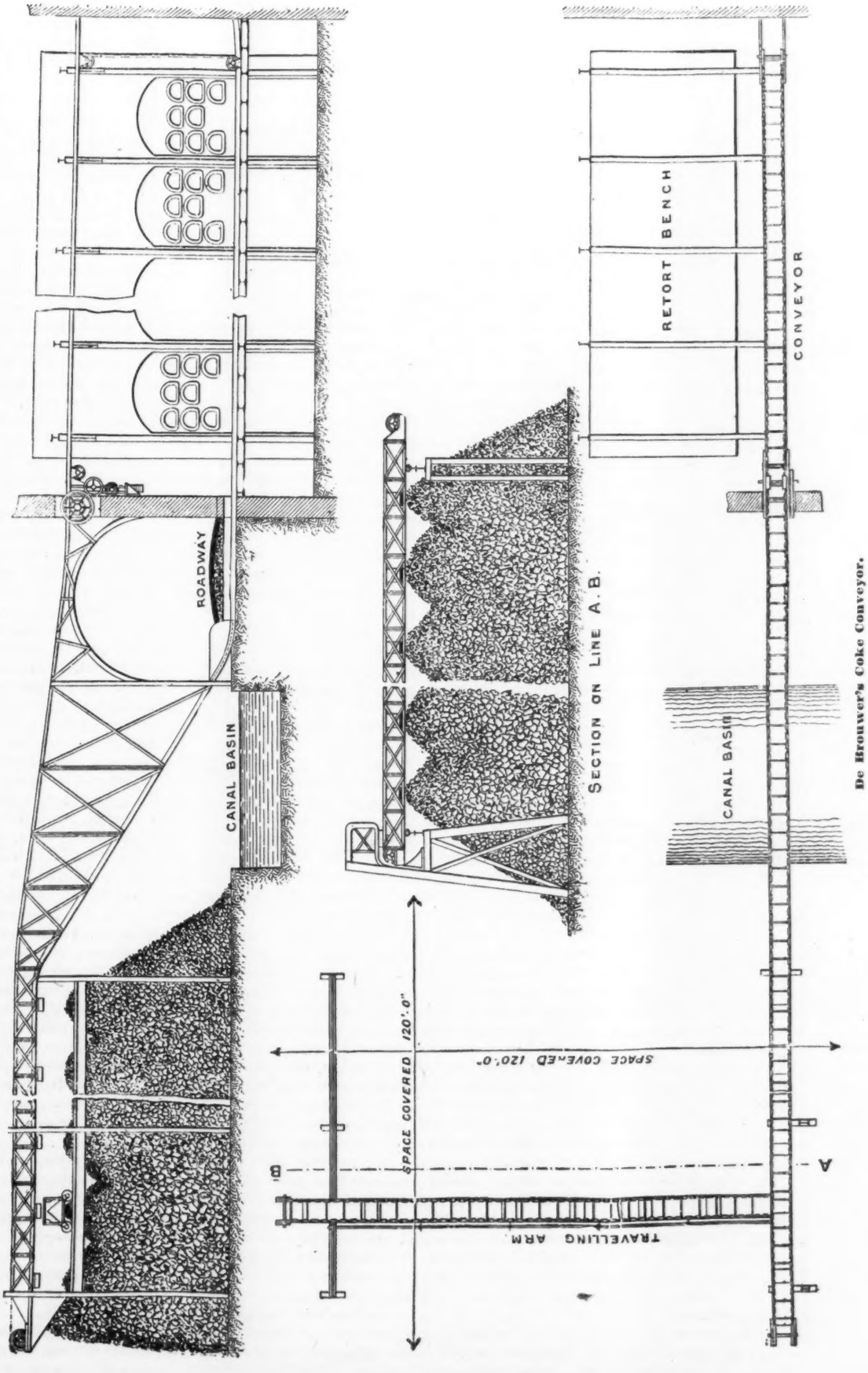


The Gaythorn Coke Conveyor.

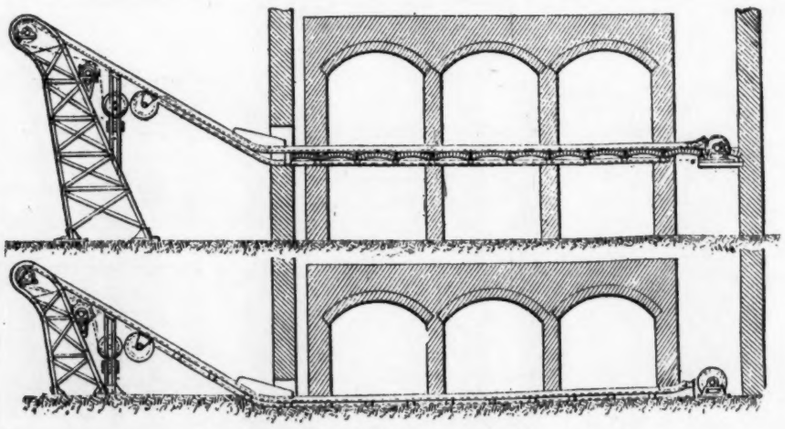
2. *The Smethwick Coke Conveyor*—This conveyor is formed by a tapered cast iron trough made in lengths from 4 to 6 feet, and fixed conveniently below the mouthpieces of inclined or horizontal retorts. The bottom of the trough has a raised part running all along, to form a small gutter at each side into which the coke dust falls, and is conveyed, by means of push plates or scrapers, to the breeze or dust collecting box fixed at the delivery end. The center part of the trough on which the endless chain slides is formed of Australian "iron wood," in double strips, the top strip being secured to the under one in a way which admits of easy and cheap renewal. The chain is formed of alternate ordinary oblong links and flat steel section bar links. Each of the oblong links is made from a bar of round steel bent to fit into the openings in the flat bar links. This form of chain is free from pins, and the slide gutters keep away the dust and grit from the joints of the chain. The endless chain travels on the wood path all along the trough and round the driving or end drums in the usual way, and back over the rollers carried by hangers under the trough slings or standards. After the round links are threaded through the openings of the flat links, the openings in the latter are closed over by a cover plate, and on the top of this cover plate there is fixed to each flat link another plate of the proper width to work in the trough; these coke carrying plates are about an inch longer than two links, so that a neat joggle is formed to overlap each plate and present nearly a level steel belt surface, on which the hot coke falls to be conveyed. These plates form a



The Smethwiok Coke Conveyor.



De Brouwer's Coke Conveyor.



De Brouwer Coke Conveyor.

moving bottom to the trough, by which the coke is conveyed along at about 30 feet per minute. The dust, so detrimental formerly to chains unprotected from coke grit, falls between the edges of the plates and the sides of the trough into the side gutters, from whence it is removed by the push plates, fixed at intervals of 4 to 10 feet, to the underside of the plates, so that, as the machine is at work conveying and slaking the coke along the trough, the push plates or scrapers also scrape the coke dust along the gutters and deliver out at the end of the trough. In the installation of this coke conveyor at Smethwick, the four beds on the right hand side are inclined retorts, and all the others ordinary horizontal retorts, and the coke from both is carried in the way already described to the end of the retort house into the elevator, and thence to the overhead conveyor which delivers it through the coke screen to the barges or over the storage yard.

3. *The De Brouwer Patent Coke Conveyor.*—This conveyor has been in use on the Continent in Holland, Belgium, Germany and France for several years, and on account of its great simplicity it has succeeded in doing work which has caused many other schemes to be abandoned. By means of simple cross bars the coke, both large and small, is moved along without turning over or crushing, simply sliding steadily along from end to end of the conveyor and up the sloping delivery end to any desired height. The De Brouwer conveyor consists of a shallow trough placed in or on the retort house floor, and a double length of special chain kept apart by distance bars at intervals of about 2 feet, so as to run parallel and form the transmitting portion of the apparatus. The trough is made of cast iron, mild steel or wrought iron, and varies from 20 inches wide for small settings of horizontal retorts up to 2 feet 9 inches wide for large installations of inclined retorts, the width depending upon local circumstances. The depth of the trough is determined by the style of the floor, but is usually 5 inches, though for wide conveyors 3 inches will answer quite satisfactorily, because the bulk of the coke falls near the center of the pan, which is made very wide to give ample room, so that no shoveling is required.

The chains are kept purposely as near the side of the trough as possible, because the greater portion of the coke falls in the center, very little reaching the sides, consequently less wear and tear comes upon the chains. The bottom of the trough is also quite flat and plain, without projections or other causes of obstruction and friction to the moving coke. The bottom plate, usually about ⅜-inch thick, is riveted to two angle irons, one on each side forming the sides, and the joint is made watertight. Then the removable wearing angles or strips are fixed to the corners to carry the chains. All bolts and rivets inside the pans are countersunk, and no projections are allowed. Near each end the pan is bent upwards, so that the quenching water may not escape, and at the delivery end, when the coke requires to be placed in hoppers or railway wagons or on the store heap, the conveyor is bent upwards at any suitable angle and carried to any convenient height; it may then be bent horizontal again and carried any desired distance. In cases where it is inconvenient to have the return chain carried above the mouthpieces, owing to want of space on account of stoking machinery or other causes, the return chain can be carried back directly under the delivery pan all the way, the total depth of the whole conveyor not exceeding 8 inches throughout.

Water for keeping the chains and pan cool and for quenching purposes is run into the pan continuously while the conveyor is at work. At the commencement the trough is partly full of water throughout its length, but as soon as the coke begins to be drawn it pushes the water before it along the trough, and for some distance up the quenching slope at the delivery end, when the water overflows back over the still hot coke and saturates it, thus completing the quenching. Comparatively little steam is produced in the retort house until the quenching slope is reached, when large volumes are generated, for the quenching is thoroughly done, and the coke requires no further attention to put it out.

The De Brouwer conveyor transmits its load of coke from the retort house floor to any height and any distance in a straight line without once dropping it or changing its position, in relation to the propelling bars and the pan of the conveyor. When it becomes necessary to change the direction to one at any angle, the coke need not be dropped more than 1 foot, for the construction of the chain is such that either the top or bottom strand can be used equally well for conveying.

The use of the conveyor as an inclined elevator is nearly always adopted; for instance, at Bruges there are two conveyors, and at Ghent eight, each with an inclined end going up about 16 feet, and delivering at the top. At Ostend there are two conveyors in front of the benches, each with inclined ends going up about 20 feet, besides other installations of the same kind at other works. At Bruges, the Hague and Ostend the return chain is overhead.

At Ghent the eight retort house conveyors have the return under the delivery pan, and nothing can be seen of the conveyor in the retort house except the shallow trough in the floor, while outside the retort house the sloping end appears to be a girder of 7½ inches in depth, the whole of the delivery and return being included in that space. In these works the removal of the coke from 24 through beds of eights, arranged in four stacks of six through settings each, is done by the foreman who starts the conveyors by throwing a clutch into gear when required, and the coke is delivered into the yard at a height of 15 feet, and a distance of 35 feet from the retort house, without any further labor or attention.

One of the features of this conveyor is the chain, which is formed of block links alternating with double links, the block links being made especially high to take all the wear due to rubbing on the wearing strips of the pan. The single links are connected in such a manner that wear must come upon the full width of the portion passing through the hole in the block link, and they are held together by rivets which are made easy of removal while being perfectly secure. The difficulty of keeping rivets tight when subjected to variations of temperature has been avoided in the recent De Brouwer chains by arranging the rivets so that they form no part of the wearing surface, but have the sole function of holding the links in place, so it does not in the least matter whether the rivets are tight or loose.

The load due to the weight of the chain forms by far the greater portion of the work and wear, that due to the coke being comparatively unimportant. A moving weight of 15 pounds per foot run is attained against at least 30 pounds, with plate or scraper conveyors of the same width and capacity. A conveyor to remove 20 tons of coke per hour would require a trough weighing about 2¼ cwt. per yard, and the chain for a long length of conveyor would weigh about 45 pounds per yard, including all the moving portion; for a shorter portion it would be about 36 pounds per yard.

One of the diagrams shows the coke conveyor arranged to deal with the coke from nine beds of 8's, horizontal retorts, and four beds of 8 inclined, 20 feet long. The coke had to be taken out at the end of the retort house, under a roadway, over a canal, and then to be screened

and loaded into boats, or stored on a surface of 120 feet long by 120 feet wide, to a height of 26 feet. The diagram shows the scheme in plan, elevation and cross section near the traveling gantry. It was proposed to take the coke from the retort house to the quenching slope outside, then up the inclined end to the desired height, then over the canal to a distance of 170 feet from the retort house wall along a light latticed iron or steel bridge supported on standards formed of 12-inch by 6-inch rolled joists. These joists formed the supports for girders carrying rails on which the traveling span would run, and at about 85 feet span a second line of supports and rails would be laid to carry the outer end of the traveling span. A simple and light lattice bridge of about 100 feet long would carry the conveyor transmitting apparatus, and the coke could be delivered at the end or at any number of intermediate points. The bridge would be propelled at intervals by hand as the space became filled, and the driving of the sprockets would be by means of ropes passing partly round three pulleys arranged exactly as is usual on rope-power traveling cranes. About 2,000 tons of coke could thus be stored without requiring more labor than the services of one man per shift to start and stop the conveyor, and place the traveling span where desired. The total length of the conveyor was about 380 feet from end to end.

As regards the amount of labor required to deal with the coke, it may be said that even in large installations, not more than one man will be wanted for attending to the conveyor and delivering the coke from it.

The next section of the paper dealt with the proposed design for coke handling plant at the new retort house of the Halifax Gas Works—a house, 266 feet long, intended for inclined retorts, with 17 settings on the north side and 25 settings on the south. The quantity of coal to be charged per hour is estimated at 21 tons; and the quantity of coke at a maximum of 55 tons per hour. We intend giving some particulars of this plant in a later issue. The author concluded his paper as follows.

The points of similarity and dissimilarity may be noted, and the cost in interest on capital, wear and tear, and labor estimated relative to each individual case. It has been found impossible to make a comparison of the cost for an ideal combination of retort house and coke yard for the different types of plant; but even if this had been done, the local conditions of each case would be the determining factor. The author believes that the appliances now available, should allow, in large works, of coke-handling being done for a labor charge not exceeding 2d. per ton of coal carbonized.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Pranks of Those Interested in Opposition Gas Enterprises.

PORT HURON, MICH, June 3, 1899.

To the Editors AMERICAN GAS LIGHT JOURNAL: If there is one topic more than another which should command the attention of men interested in the gas industry at the present time, it is the recent revival of efforts in various places toward the formation of opposition gas companies, the tendencies of which are not only detrimental to the business interests and properties of established interests, but are also dangerous to the citizens of the communities in which they arise. This does not take into question whatever the inestimable damage done to improved streets and by-ways which would require years for complete restoration.

In nearly every instance of the kind somebody springs to the front with some alleged apparatus, heralded as superior in economical construction and results to all which have gone before, blinding the vision of the unsuspecting public and exploiting dazzling theories which captivate and victimize unguarded capital. When swindlers and frauds cease to exist, the millennium will surely be at hand, and when fools are no more the cemeteries of the land will have been completely filled, and cremation of the dead will be a general and accepted practice. But at this time present evils compel us to refrain from philosophizing on the future and to reflect upon the emergencies which confront us.

Upon first sight the promises of competition in this field have a very pleasant effect upon the general public. After it has been tried for a time, and the competing companies have grown tired of the losing methods of a Kilkenny cat fight, consolidation occurs and there is a consequent awakening to the fact that greater burdens than those due to a so-called monopoly have been added to the lot of gas consumers. The final union of competing interests must necessarily add to one operating plant a needless investment upon which taxes and interest must be paid.

The average gas consumer has become possessed with the idea that a gas company and its operators must necessarily be enemies to society and the common weal. To illustrate the fact that such an idea is erroneous, and not based upon facts, we may call attention to numerous reductions of rates made at no solicitation and under no statutory compulsion. Probably no other class of business men in the land have made a more complete and constant study of their patrons' wants, or gone to greater lengths to still their dissatisfied and frequently groundless clamorings, than have the officers of gas companies. While it is true we have received very little credit for this, nevertheless we can without hesitation invite the most searching investigation intended to prove the contrary. The progressive manager unhampered by threats of opposition will lower his rates and make a bid for new business whenever good judgment shall indicate such a course as proper to pursue. Place him in a position where he is compelled to fight and exterminate a blackmailing foe, the result must invariably be a cheap product and cheap labor, and few if any improvements to his works or main system. Those who have gone through such an experience know exactly what that means.

Apropos of this subject the writer may refer to circumstances past and present at Port Huron, Mich. For several years in that city two companies waged an unprofitable warfare, both finally succumbing to the inevitable and passing into the hands of a new organization, which consolidated the plants. In order to place the business on a firm basis, it was necessary to increase the rates from 90 and 45 cents to $1.25 and 80 cents, net, respectively for illuminating and fuel purposes. It was expected that even more dissatisfaction than followed would result from this increase. To offset this, however, the new company charged nothing whatever for services and stove connections, while the old companies even charged the consumer when it was necessary to attend a simple complaint.

At the outset rumors of contemplated organized opposition were heard, but there were and still exist excellent reasons why no local capital could be interested in such a movement. Not many years had elapsed since the formation of the St. Clair Fuel Company, whose mission it was to distribute natural gas for a few days only from a few shallow pockets in the vicinity. A number of local men had interested themselves in this enterprise, if such it can legitimately be called. They distinctly remember their experience and are not anxious for more of a similar nature. The failure of this brief natural gas supply led directly to the organization of the Port Huron Fuel Gas and Lighting Company, which erected a crude plant of the Archer type, and began an opposition to the old and established Port Huron Gas Light Company.

From first to last this was a losing venture, and it finally became necessary for the mortgagees to foreclose a claim of about $14,000, and, failing in an effort to pass the plant into other hands, they were compelled to take and operate it themselves. The property as originally existing could not have been duplicated for less than $25,000, yet so complete had been its failure that it was sacrificed to satisfy the mortgage alone. It is hardly necessary to state that the construction men, who received remuneration for their material and work, were those only who compelled the promoters of this concern to give good and reliable security. As a result of this foresight several Pittsburgh men of means bade farewell to several thousands, which no doubt they never saw again.

The history from this point on has been a familiar one, and reads very much like that of similar ventures. The only achievement that could be credited to the plant was that it injured the other one.

Now comes the present move, which seems to be sired by Eugene Schoolcraft, a real estate man, who seems to be in the habit of attempting such things and conniving at the business of others. This man has been exceedingly talkative, both on the sidewalk and through the press, just as he was on previous occasions when carrying in his inside coat pocket electric franchises, which he carried there so long that they naturally died of old age. Whether he ever "bilked" the electric lighting company or not, the books do not say; if he didn't, those franchises never served any purpose whatever. Associated with him is G. B. Stocks, an old gentleman, who has no other legitimate occupation than discovering around Port Huron unmistakable signs of a rich oil field. They paraded their theories in fine style and finally elicited the pecuniary aid of eastern capital in search for a sinkhole. While in the act of sinking a few thousands for the eastern man, who no doubt has received many glowing and encouraging reports from the said Stocks and Schoolcraft, the latter applied to the City Council and

received a franchise to manufacture and sell gas at bargain prices, namely, at 99 cents for illuminating and 48 cents for fuel purposes. Mr. Stocks, who poses as a sage in matters relating to gas and oil, poured forth into the ears of the press tales of how different qualities of gas should be made, and how a fuel gas should be made which has a nice, blue, high-temperature flame, but failed to explain how much of such a gas would be required to do the work of the common commercial article. Schoolcraft, who has been the advertising agent, informed the public that there was a man down east with money to burn who was going to let them burn it for him. The eastern man seems to be regarded as an awful easy thing, but they have kept him at a sufficient geographical distance to prevent him from smelling the nauseating smoke.

Just in time to prevent their franchise from lapsing these parties effected an organization. Among the incorporators, in addition to the parties named, were an old business man and two members of the City Council, to whom personal appeals were made. Not one of these parties wishes to become interested financially and would not be. One of them has stated that he subscribed to the articles of incorporation merely to satisfy the clamorings of his friend Schoolcraft, and that he wished heartily that he had stayed out of it altogether. Schoolcraft's plea was that it was necessary to obtain local subscribers in order to raise outside capital for the project; in other words, in order to pull the legs of people who were not on the field of action. Perhaps it may be his intention to attempt to victimize the stockholders of the present company, as the whole thing looks like either bluff or blackmail.

From time to time visionary "gas experts" of unknown names and doubtful ability are mentioned, and the new company starts at once to erect a paper works. It may be wondered sometimes why reputable gas engineers object to being called "gas experts," but this can be easily explained by the fact that the *expert* can (to hear him tell it) controvert the laws of the Almighty and put to flight all axioms of science, while an engineer can do no more than make the best of the natural laws, appliances and materials which God has given him.

It is high time to put a stop to the machinations of a lot of these systematic gaffers, who, in defiance of all honorable instincts, seek to fleece one party or another and possibly both at every turn. The parties who are being imposed upon should be warned, but there seems no way to do this effectually excepting by an exposure in print.

The writer can say without fear of truthful contradiction that not a well has ever been sunk in St. Clair county, or any other county in Michigan, which has yielded oil in any paying quantity; and, furthermore, the Eastern party or parties who are putting up the money for the present investigations in that neighborhood are simply allowing themselves to be inveigled into repeating the efforts of people who have examined that territory and passed it up again. A hint to the wise should always be sufficient, and the advice of the writer would be for parties to go over the ground themselves, look at their own investments and carefully inquire into things before following the rainbows of shysters and beats. This plan might decrease the number of investments, but it would also have a similar effect upon the class of undesirable citizens mentioned before. Yours truly, A RESIDENT.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. H. ALLEN ODELL has resigned the Presidency of the Pulaski Gas Light Company, of Little Rock, Ark. Mr. S. M. Apperson, Vice-President of the Company, has been named to serve it as President *pro tem.*

LAST week we noted briefly the concession made to the gas consumers of Morristown, N. J., by the proprietors of the Morristown Gas Light Company. Since that notification we have received a copy of the official announcement made by the Secretary of the Company, Mr. James R. Voorhees, which announcement reads as follows:

"The Morristown Gas Light Company takes pleasure in announcing that it has adopted the following reduced prices for gas furnished to its patrons after the 1st day of June, 1899: For lighting: To all consumers of less than 5,000 cubic feet per month, $1.75 per 1,000; to all consumers of 5,000 cubic feet and over per month, $1.65 per 1,000. For cooking, heating and power: To all consumers, $1.50 per 1,000. A discount of 5 cents per 1,000 cubic feet consumed will be allowed on all bills for the preceding month, paid on or before the 15th day of the current month."

THE former rates at Morristown were: For a residence service, $2; for a store, $1.80; gas for cooking, heating and power, $1.60.

WE are more than pleased to report that, whatever the change in the ownership of the Burlington (Iowa) Gas Light Company may be, Mr. E. D. Clary will continue in the position of its General Manager.

AT the annual meeting of the shareholders in the Peoria (Ills) Gas Light and Coke Company the officers chosen were: Directors, Thomas Coffey, Matthew Farrelly, Wm. A. Herron, Nicholas Henebery, John C. Proctor and A. C. Moore—Mr. Proctor replaces Mr. Leslie Robinson; President and Superintendent, Thomas Coffey; Treasurer, Matthew Henebery; Secretary, Matthew Farrelly. Judging from the tenor of the speeches made at the meeting, respecting the attitude the Company has taken over the attempt of an opposition concern to divide the gas business of the city, the filibusters will have as much chance to win as have the Fillipinos.

A CORRESPONDENT wants to know who the proprietors of the Norwalk (Conn.) Heating and Lighting Company are; also, as to their purposes. Inquiry develops this statement. The officers of the concern are: President, J. D. Kinney; Vice-President, W. K. Maples; Secretary, Jas. W. Maples; Treasurer, Moses H. Glover; General Manager, Frank I. Jones. The headquarters of the above are in the Quintard Building, Norwalk, and the proposition is to exploit the sale of acetylene gas machines.

THERE is no truth in the rumor that the electric lighting interests of Wilmington, Del., have secured a controlling interest in the Wilmington Coal Gas Light Company. Further, there is no likelihood they will secure such control in the immediate, near or remote future.

THE improvements on the plant of the Passadena Consolidated Gas Company, of Passadena, Cal., projected and underway, involve an expenditure of not less than $10,000. A storage holder (rated to retain 60,000 cubic feet) and a new set of purifying boxes are embraced in the plans.

THE indications are that the gas plant for Torrington, Conn., will be completed well within the limits granted to or prescribed for its contractors.

DOLLAR gas now rules in Hartford, Conn.; but General Harbison is not satisfied—he says it will go lower.

MR. CHARLES G. ANDREWS, of Pittsburgh, Pa., has been appointed Superintendent of the Galion (O.) Gas Company.

ON the 1st inst. the properties and franchises of the Racine (Wis.) Gas Company passed formally into the control of Messrs. Henry P. Payne, Frank G. Bigelow and E. G. Cowdery, of Milwaukee. The purchasers have no fear of any opposition at Racine, in that they propose to conduct the Company's business along lines sure to give satisfaction to the authorities and to the residents.

OWING to the increase in the consumption of gas in Toronto the Consumers Gas Company of that city has found it necessary to install a new set of 4 purifying boxes, 30 feet by 30 feet, with steel plate covers and traveling floor carriages. The contract for this work has been awarded to the Economical Gas Apparatus Construction Company. The constructors will also place a cast iron floor, laid on steel joists, and two hydraulic elevators for lifting the oxide from the lower or revivifying floor to the boxes. The floor will come flush with the top edge of the boxes for the convenient handling of the purifying material. The work, which is well in hand, will be completed by the 15th of August.

THE Berlin Iron Bridge Company, of East Berlin, Conn., is under contract to make extensive additions to the plant of the Wheeler & Wilson Manufacturing Company, Bridgeport, Conn.

THE authorities of the town of Westfield, Mass., have taken possession of the plants (gas and electric) of the Westfield Gas Light Company. They seem to be rather mixed up over the selection of a General Manager, but that is not to be wondered at when it is considered that the position was offered to Mr. William F. Thayer, formerly Secretary, Treasurer and Superintendent of the Westfield Company, with the understanding that his salary was to be $1,200 per annum. The Company paid him $2,000, and naturally Mr. Thayer declined the appointment, without thanks.

A CHARTER has been issued to the Hampton (Va.) Gas Company, which is formed for the purpose of manufacturing and distributing gas in the place named. The concern is capitalized in $50,000, and its

officers are: Directors, John C. Robinson, J. W. Hope, James Sclater, Jr., S. M. Richter, F. A. Shield, T. S. Howell, H. M. Mugler, M. C. Armstrong, W. E. Lawson, L. F. Whiting and George W. Hope; President, Jno. C. Robinson; Vice-President, J. W. Hope; Secretary and Treasurer, Jas. Sclater. The correspondent who forwards this information also says: "The projectors of the Company have applied to the Town Council for the privilege to construct, maintain and operate a gas plant, and to lay such pipes, mains and conduits through the streets and public places of the town of Hampton as will be necessary to enable it to supply the residents with gas for lighting, cooking and power uses. The Company agrees to supply gas at the following rates: For the first term of 10 years, $1.60 per 1,000; for the second term of 10 years, $1.35 per 1,000; thereafter, $1 per 1,000."

THE United Gas Improvement Company has under contract the rebuilding of the works of the Putnam (Conn.) Light and Power Company. In accordance with the terms of the agreement it will install a set of standard, double superheater, Lowe water gas apparatus, of a daily capacity of about 125,000 cubic feet. The old Peter English form of water gas apparatus has been worked in Putnam for many years.

THE Salem (N. J.) Gas Company has placed in the hands of Mr. Frederick H. Shelton, of Philadelphia, the matter of supervising the construction of new benches and other improvements on its plant.

MR. P. DIELMAN has been appointed General Manager of the Racine (Wis.) Gas Light Company.

AT the annual meeting of the Binghamton (N. Y.) Gas Company the following officers were elected: Directors, Emerson McMillin, W. F. Douthirt, James W. Manier, W. G. Phelps, George F. O'Neill, S. J. Hirschmann, George W. Dunn, C. M. Stone and C. C. Jackson; President, Emerson McMillin; Vice-President, James W. Manier; Secretary, W. F. Douthirt; Treasurer, Robert W. Manier; General Manager and Assistant Secretary, Fred. B. Wheeler.

THE properties of the Goshen (Ind.) Gas Light Company have been purchased by a syndicate headed by Messrs. James T. Lynn, Chas. T. Garvin and F. H. Shelton. The title of the corporation has been changed to that of the Goshen Gas Company, and the officers are: President, James T. Lynn; Vice-President, Chas. T. Garvin; Secretary and Treasurer, F. H. Shelton. The capital stock amounts to $60,000, and $60,000 bonds have also been issued. Goshen is about 10 miles southeast of Elkhart, and its population is not less than 10,000. It is quite an important manufacturing center, and its growth is of the sort that insures stability.

AT the annual meeting of the Camden (N. J.) Gas Light Company the officers chosen were: Directors, B. F. Archer, Charles C. Watson, John McIlhenny, Richard T. Smith and Samuel C. Cooper; President, B. F. Archer; Secretary and Treasurer, Charles C. Watson.

A CORRESPONDENT in Rochester, N. Y., forwards the following: "During the last week in May the Newark (N. Y.) Gas Light, Fuel and Power Company was organized with a capital of $50,000, and the following officers were elected: Directors, E. H. Jenkins, E. E. Witherby, Walter D. Ingham, John Otto, Jr., George B. Webster and Clark L. Ingham, of Buffalo, and Mitchell Chadwick, of Newark; President, E. H. Jenkins; Vice-President, E. E. Witherby; Secretary and Treasurer, Walter D. Ingham. A site for the plant has been purchased, the location of which is on Willow avenue, near the West Shore Railroad crossing."

THE Kerr Murray Manufacturing Company, of Fort Wayne, Ind., has been awarded the contract to furnish and erect all the iron work for 20 benches of Coze inclined sixes for the Louisville (Ky.) Gas Company. The bench work has been awarded to the Laclede Firebrick Manufacturing Company, of St. Louis, Mo.

MR. B. G. DAWES has acquired the holdings known as the minority stock in the Pulaski Gas Light Company, of Little Rock, Ark.

THE Peoples Gas Light and Coke Company, of Chicago, will construct additional water gas apparatus, up to a daily capacity of 3,600,000 cubic feet. The installation will be made by the United Gas Improvement Company.

A CORRESPONDENT incloses the following notification recently issued by the proprietors of the Danvers (Mass.) Gas Light Company: "The Danvers Gas Light Company has recently come under a new management and it will be the object of the managers to deal with customers on an equitable basis. The general policy of the Company will be to reduce the price of gas to consumers as fast as the conditions and consumption warrant. The first reduction will be made by placing the gross price at $2.50 per 1,000 cubic feet, instead of $3 as at present, with a reduction on all bills settled before the 15th of the month. On and after June 1st prices for gas will be as follows: Maximum price, $2.50 per 1,000; all bills amounting to $1 or less, net; all bills amounting to from $1 to $15 per month, 12½ per cent. discount, making net price $2.19 per 1,000; all bills from $15 and upwards, as well as for gas consumed in gas engines, 20 per cent. discount, making net price $2. Gas stoves will be supplied at cost to the Company and connected with pipe in house free of charge."

IN a report submitted to the Committee on Light, of the Richmond (Va.) City Councils, by Superintendent Knowles, of the City Gas Works, respecting the sum needed to put the plant in complete condition to respond to the demands that might be made upon it for the next 20 years, the Superintendent figured the cost at $257,000.

ON the 1st inst. ownership in the Sunbury (Pa.) Gas Light Company was acquired by Mr. Frederick H. Shelton, of Philadelphia, and his associates. They propose to make many changes in the plant. Sunbury, besides its important place in connection with the Pennsylvania and the Philadelphia and Erie Railroad systems, is noted for the diversity of its manufacturing interests.

A CORRESPONDENT in Toronto, Canada, forwards the following, taken from an English newspaper: "It was in Bradford. An old man was about to step in front of a steam tram going at full speed, when a hand seized him and flung him back. It was a narrow shave, and as soon as the old man realized it he exclaimed: 'You have saved my life, and I can never repay the debt.' 'I deserve no thanks,' was the modest reply. 'But you deserve more than thanks. I am a rich man, and I want to give you some substantial token of my gratitude. Here—let me write you a check for—' 'I couldn't accept anything—really I couldn't,' protested the other; 'but there is something you might do for me, all the same.' 'Speak and it shall be done.' 'You are a rich man, and I know you by name. I am Secretary of the Gas Company. Every month when you come in to pay your bill you make a tremendous row for half an hour, and declare that we are highway robbers. If you would only agree—' 'Not to make a row over my gas bill? Never, sir; never! You saved my life, and I am ready to draw you a check for £10,000; but as for foregoing a privilege granted only to free-born Britons, I can't surrender it—couldn't do it if you saved my life a dozen times over!'"

Watt-Meters vs. Watt-Hour Meters.

The *Electrical World and Engineer* says: It is very common to designate a recording watt-hour meter, say of the regular Thomson-Houston type, as a recording wattmeter. The designation may serve to indicate the instrument quite clearly, but it is none the less incorrect. If we attach a centrifugal indicator to the axle of a carriage, as is sometimes done in test cars on electric railways, the apparatus may be calibrated to indicate the speed in miles per hour, and is a speed indicator. If we connect this speed indicator through gear wheels with a counter or register, so that it shall integrate the speed throughout time, the result indicated would be distance in miles traversed. In this case, speed is the analogue of rate of working or power, as measured in watts, while the integrated result in time, is distance and corresponds to the total energy integrated, or watt hours. It would be obviously ridiculous to call a bicycle cyclometer a speed recorder, because it does not record speed—it only records distances. It is just as ridiculous to call a recording energy meter a wattmeter—since it does not record watts—it only records watt hours. It is often urged that such criticism is hypercritical, and that no harm can follow the incorrect use of the term registering wattmeter, while the pedantic effort after accuracy in the term watt hour meter may lead to ridicule and confusion. The fact is, however, that it is just as easy to be correct as to be incorrect, and, moreover, the looseness with which we use terms is apt to recoil upon our own heads through the serious errors that may follow, either by oversight in habit, or by misleading others. When we mark upon the name plate of an instrument a misleading title, we not only tempt those who know better into loose language, but we also plant an erroneous

(*Continued on page* 896.)

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 32 Pine Street, New York.

The JOURNAL is the official organ of the
NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
AMERICAN GAS LIGHT ASSOCIATION.
WESTERN GAS ASSOCIATION.
OHIO GAS LIGHT ASSOCIATION.
PACIFIC COAST GAS ASSOCIATION.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance. Single copies, 10 Cents.

Notification Respecting Advertising.—Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, JUNE 12, 1899.

(*Continued from page* 895.)

impression into the minds of those who do not know better, and make the task of technical education by so much the more difficult.

It is sometimes urged on behalf of commonly misused terms that their continued use is justified by the general voice or the majority vote. This is always a just plea if the statistics as to the general use will bear out the allegation. Thus, it has been claimed by philologists that the term "electrocution" is altogether wrong from the standpoint of language and is a meaningless word. That might be true before the word came into use and might be a reason for avoiding the use of the word. But at the present time the word is so extensively employed that it bids defiance to its legitimate birth. The case is different, however, in the domain of physics when a correct and an incorrect term are both applicable to the same thing. It must always be wrong to call a bicycle cyclometer a speed meter so long as speed is accepted to mean rate of motion. It can only under any circumstances be correct to call it a speed meter, when speed shall have ceased to mean rate of motion. In the same way, so long as the watt is agreed to mean a rate of working, it is quite impossible for the term "recording wattmeter" correctly to apply to a watt hour meter, which is a particular kind of joule meter.

An Interesting Decision.

Engineering News reports that a legal decision of interest to contractors for public work in New York State has been handed down by the State Supreme Court in the case of Wm. J. O'Brien, of the New York branch of the Granite Cutters' National Union, against the Commissioners of the new East River Bridge. The case arose out of the violation of the State labor laws by the contractors for the anchorages of the new bridge. At the time the contract was entered into there were two laws in force; one making eight hours a legal day's work for laborers, mechanics and workmen employed by the State or a municipal corporation or a contractor for public works, and, the other providing that all laborers, mechanics and workmen employed on any public work shall receive not less than the prevailing rates of wages in the respective trades in which they are employed in said locality. The contracts for the bridge contained clauses requiring the contractors to comply with the foregoing statutory requirements. Complaints were made to the Bridge Commission that the contractors were violating the laws and contract requirements as given. The Commission referred these complaints to the Corporation Counsel, who advised that: "It would seem to be the safer and better course for the Commission to wait and let the complainants take the case to the court and abide by the decision of the court, than to take any action at the present time in regard to declaring the contracts canceled by reason of the acts of the contractors said to be in violation of the statutes of the State." This advice was followed and the case was carried to the court, which decided that: It is the duty of the Commissioners to entertain and investigate complaints made against contractors engaged in the work of construction of violation of the provisions of the labor law, making eight hours a legal day's work and requiring the payment of wages at the prevailing rates in the locality where any public work is being carried on, and to act judicially in their discretion upon applications for forfeiture of contracts, as prescribed by the labor law, for such violations of the provisions aforesaid as may be established, especially if contracts for public work themselves expressly embody such provisions as to hours of labor and payment of wages. Any citizen has the right to institute and maintain a proceeding for mandamus to compel public officers to perform a public duty, although the relator has no private right to be enforced and no personal grievance to be corrected. This decision, it will be seen, is more wide-reaching than the East River Bridge work merely. It makes it possible for any citizen and householder to compel contractors for public work to obey the statutory requirements of the State laws respecting hours of labor and the wages paid for this labor.

The Market for Gas Securities.

During the week the market for city shares was dull and very uneven. Consolidated sold down to 163, and after noon to-day (Friday) sales were made at a good fraction above 172. The signs are that the magnates are tiring of their heroic efforts to shake out investment stock by selling gas at prices that are nothing short of ruinous; and it should always be remembered that the magnates are not overfond of losing their own money for anything like a long spell. Again we repeat that surface indications all go to show that some sort of settlement is being considered. Amsterdams are very weak, which remark applies to the bonds as well as to the two varieties of its shares. Northern Union bonds are being inquired for. Brooklyn Union hovers between 135 and 140, but it would be selling at 175 were it not for the rumpus between the Manhattan borough Companies. It must be earning well over 10 per cent. Peoples, of Chicago, is 119 bid, with every prospect that before August 1st it will be at least 125. Bay State is 2⅛ to 2¼. Cincinnati gas is 186 bid, and Hartford (Conn.) gas is offered at 220.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks,

16 WALL STREET, NEW YORK CITY.

JUNE 12.

☞ All communications will receive particular attention

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$39,078,000	100	172⅜	173¼
Central Union, Bonds, 5's.	3,000,000	1,000	107½	108½
Equitable Bonds, 6's	1,000,000	1,000	105	.
" 1st Con. 5's	2,300,000	1,000	115	118
Metropolitan Bonds	658,000	.	108	112
Mutual	3,500,000	100	280	310
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
New Amsterdam Gas Co.	13,000,000	100	31	..
Preferred	10,000,000	100	56	57
Bonds, 5's	11,000,000	1,000	100½	101
Northern Union, Bonds, 5's.	1,250,000	1,000	95	97
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	109	111
" 1st Con. 5's	1,500,000	..	112	114
Richmond Co., S. I.	348,650	50	70	..
" Bonds.	100,000	1,000	..	..
Standard	5,000,000	100	110	120
Preferred	5,000,000	100	125	137
Bonds, 1st Mortgage, 5's	1,500,000	1,000	112	114
Yonkers	299,65	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	138	..
" " Bonds (5's)	15 000,000	1,000	118	119
Bay State	50,000,000	50	2⅛	2¼
" Income Bonds.	2,000,000	1,000	..	75
Binghamton Gas Works..	450,000	100	40	..
" 1st Mtg. 5's	450,000	1,000	95	98
Boston United Gas Co.—				
1s Series S. F. Trust	7,000,000	1,000	92	..
2d " " "	3,000,000	1,000	68	71
Buffalo City Gas Co.	5,500,000	100	12	14
" " Bonds, 5's	5,250,000	1,000	89	91
Central, San Francisco	2,000,000	..	105	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Columbus	1,144,700	100	70	75
1st Mortgage	1,207,000	1,000	106	108
Consumers, Jersey City	2,000,000	100	95	.
" Bonds	600,090	1,000	107½	110
Cincinnati G. & C. Co.	8,500,000	100	186	187
Consumers, Toronto	1,700,000	50	230	235
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Consolidated, Baltimore	11,000,000	100	63½	63¾
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	23	25
" Con. Mtg. 5's	380,000	1,000	80	82
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,560,000	50	65	65½
" Prior Lien 5's.	4,546,000	1,000	94¼	94½
Detroit Gas Co., 5's	423,000	1,000	95½	96
" Inc. 5's	31,000	100	..	..
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	62	65
" Bonds.	2,000,000	..	80	85
Grand Rapids Gas Lt. Co..	1,000,000	50	..	..
" 1st Mtg. 5's	1,125,000	1,000	..	.
Hartford	750,000	25	..	220
Indianapolis	2,000,000	..	122	138
" Bonds, 6's.	2 650,000	..	105	106
Jackson Gas Co.	250,000	50	..	..
" 1st Mtg. 5's	250,000	1,000	..	..
Jersey City	750,000	20	225	275
Lafayette Gas Co., Ind.	1,000,000	100	68	70
Bonds	1,000,000	1,000	81	86
Louisville	2,570,000	50	106	108

Laclede, St. Louis	7,500,000	100	52	53
Preferred	2,500,000	100	99	101
Bonds	10,000,000	1,000	107	108
Madison Gas & Elec. Co.	400,000	100	68	70
" 1st Mtg. 6's	350,000	1,000	102	..
Montreal, Canada	2,000,000	100	200	..
Newark, N. J., Gas Co.	1,000,000	..	200	220
Bonds, 6's	4,000,000	..	128	130x
New Haven	1,000,000	25	280	300
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	53½	55
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	118¾	119
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,00	,000	111½	112
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	215	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	74	75
St. Paul Gas Light Co.	1,500,000	100	50	52
1st Mortgage 6's	650,000	1,000	82	85
Extension, 6's	600,000	1,000	..	..
General Mortgage, 5's	2,428,000	1,000	80	82
St. Joseph Gas Co.	1,000,000	100	..	..
" 1st Mtg. 5's	750,000	1,000	..	..
Syracuse, N. Y.	1,750,000	100	16	19
Bonds	1,612 000	1,000	85	89
Washington, D. C	2,600,000	20	250	..
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	100	97	97¾
Bonds, 5's	3,880,500	.	106	108
Wilmington, Del.	550.000		208	..

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1254-2

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1253-1 Box No. 25, Journal.

Position Desired.

A Competent and Up-to-Date Gas Engineer and Manager

wants position July 1st or August 1st. Address "W. A. L.," care this Journal.
1251-4

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On account of changes made in my present Company, I will eever my connection therewith on February 20, and solicit correspondence with Gas Companies contemplating a change of management. Eight years with present Company. References. E. G. HOLZER, Supt. Gas Dept., Roanoke Gas and Water Co., Roanoke, Va.
1238-tf

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1,500 Barrels OF Coal Tar.

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in a Southern city of 3,800 inhabitants.
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We give you

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perfect Lava Tips with every Gross you buy.

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Gas Companies should insist upon getting the Best.

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315 Fidelity Building, 112 N. Broad St., Phila.

SAFETY GAS MAIN STOPPER CO.

211-E. 116 TH ST. N.Y.

FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS

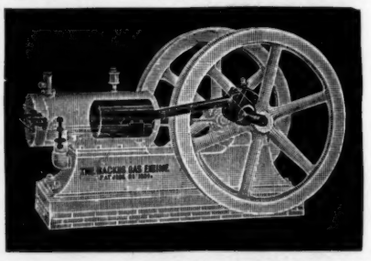
Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

Ammonia Concentrator.

Not Expensive. Write to STROH & OSIUS, Pat'ees, or Mich. Ammonia Works, Detroit, Mich.

BACKUS GAS ENGINES.



GUARANTEED SUPERIOR IN EVERY WAY. BUILT ON HONOR.

Agts. { Chicago Water Motor & Fan Co., 101 Lake St., Chicago. Michell & Co., - - 154 Congress Street, Boston, Mass.

Home Office, **Backus Water Motor Co.**, Newark, N. J.

Send for Catalogue.

Emken Chemical Co.,

175 South Street, New York City. **Works, Long Island City, N. Y.**

MINERS OF MONAZITE AND MANUFACTURERS OF

THORIUM AND CERIUM NITRATE.

ALSO MANUFACTURERS OF

INCANDESCENCE FLUID

For Making Non-Shrinking Mantles of Highest Luminosity.

BRAY'S BURNERS

Are Used in every Country in the World.

Owing to the steadily increasing demand year by year, additions to factory and plant have been constantly made, resulting in the largest and best equipped Burner plant in the world. Burners are made for all pressures and conditions. There is but one "BRAY" Burner. Accept no imitation. Write for our new Pamphlet.

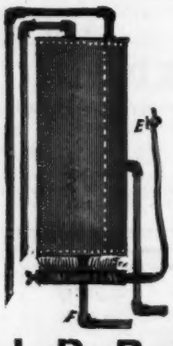
If interested in ACETYLENE BURNERS send for samples.

With Bray Burner.

WILLIAM M. CRANE COMPANY,

Nos. 1181 and 1183 Broadway, New York City.

An Economical Hot Water Heater.



PERFECT COMBUSTION. NO SMOKE. NO ODOR.

FULLY GUARANTEED.

Will heat the Water in a Boiler in less than half the time required by a Range, and at less than half the expense. Nothing to get out of order, and will last a lifetime.

BUFFALO CITY GAS CO., BUFFALO, N.Y., April 1, 1899.
J. P. B. SADTLER & Co., 813 S. Howard St., Baltimore, Md.
Gentlemen—Replying to your favor of the 30th of March. The Heller Heaters that you have already furnished seem to be large enough, and we will not at present care to use any of the larger size that you mention. We have had no complaint in regard to the Heller Heater that we have used in Buffalo, and so far they are giving us good satisfaction.
Yours very truly, E. H. JENKINS, Engineer.

BALTIMORE, MD., March 24, 1899.
J. P. B. SADTLER & Co., 813 S. Howard St., Baltimore, Md.
Gentlemen—A test of the Heller Water Heater witnessed by me March 21, 1899, showed that with a consumption of 30 feet of gas per hour, the water in a 28-gallon galvanized boiler could be heated from 59° to 102°, or 43° in one hour. Temperature of room at time of test 64°.
Respectfully,
GEO. BEADENKOPP, Ass't Engineer, Con. Gas Co.

Clamp Heater to Pipe about 4 Inches away from bottom of Boiler. Always use an independent connection, or regular Gas Stove connection, so as to get a good flow of Gas.

J. P. B. SADTLER & CO., 813 South Howard Street, Baltimore, Md.

W. H. PEARSON, Prest. W. H. PEARSON, Jr., Vice-President. J. T. WESTCOTT, M.E., Manager. L. L. MERRIFIELD, M.Inst.M.E., Chief Engineer.

THE ECONOMICAL GAS APPARATUS CONSTRUCTION CO., LD.

American Offices: 269 FRONT STREET, EAST, TORONTO, ONT.
London Offices: 19 ABINGDON STREET, WESTMINSTER, S.W.

Telegraphic Address: "CARBURETED LONDON AND TORONTO."

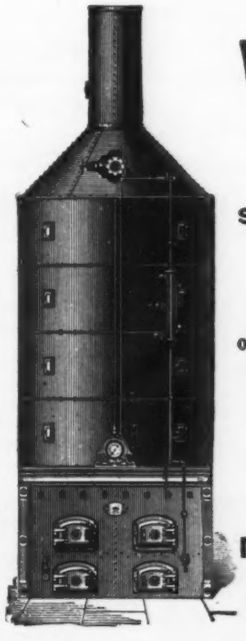
The above Company have erected since 1893, or are now erecting, their universal type of Carbureted Water Gas Plants at the following Gas Works:

	Cubic Feet Daily.
Blackburn, Eng.	1,250,000
Windsor Street Works, Birmingham, Eng.	2,000,000
Saltley Works, Birmingham, Eng.	2,000,000
Colchester, Eng.	300,000
Birkenhead, Eng.	2,250,000
Swindon (New Swindon Gas Co.), Eng.	120,000
Saltley Works, Birmingham, Eng. (2d Contract)	2,000,000
Windsor St. W'ks, Birming'm, Eng. (2d Contract)	2,000,000
Halifax, Eng.	1,000,000
Toronto,	250,000
Ottawa,	250,000
Toronto (Second Contract, Remodeled),	2,000,000
Lindsay (Remodeled),	125,000
Belleville,	250,000
Ottawa (Second Contract),	250,000
Brantford (Remodeled)	200,000
St. Catherine's (Remodeled),	250,000
Kingston, Pa.	125,000
Montreal,	500,000
Peterborough, Ont.	250,000
Wilkesbarre, Pa.	750,000
St. Catherine's (Second Contract),	250,000
Buffalo, N. Y.	2,000,000
Winnipeg, Man.	500,000
Colchester, Eng. (Second Contract),	300,000
York, Eng.	750,000
Rochester, Eng.	500,000
Kingston, Ont.	300,000
Crystal Palace District, Eng.	2,000,000
Duluth, Minn.	300,000
Caterham, Eng.	150,000
Enschede, Holland,	150,000
Leicester, Eng.	2,000,000

"THE MINER"
Globe
Street and Boulevard
Lamps.
Cheapest and Best.
THOUSANDS IN USE WITH INCANDESCENT BURNERS.
Send for Catalogues.
THOMAS T. W. MINER,
821-823 Eagle Av., N. Y.

GEORGE R. ROWLAND.
Formerly with the Continental Iron Works.
Draughtsman and Constructing Engineer.
Drawings, Specifications and Estimates furnished for the construction of new works or alteration of old works. Special attention given to Patent Office drawings.
Office, No. 245 Broadway, N. Y. City.

The Gas Engineer's Laboratory Handbook.
By JOHN HORNBY, F.I.C.
Price, $2.50.
A. M. CALLENDER & CO., 32 Pine Street, N.Y. City.



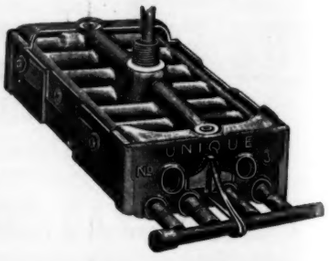
HIGH-PRESSURE
WATER-TUBE BOILERS.
THE HAZELTON OR PORCUPINE BOILER
IN 50 to 500 H. P. UNITS.
SINGLE BOILERS OR COMPACT BATTERIES.
GREAT SAVING OF FLOOR SPACE AND FUEL.
LARGE-SIZE BOILERS IN STOCK.
Our new book, "The Generation of Power," will be mailed on request.
THE HAZELTON BOILER CO.
Sole Proprietors and Manufacturers.
ALSO BUILDERS OF
Stacks, Tanks and Miscellaneous Metal Work.
GENERAL OFFICE:
No. 716 E. 13th ST., New York, U.S.A.
Cable Address, "Paila," New York.
Telephone Call, 1229-18th Street, New York.

THE ANDERSON Patent Cutter Carrying Link
Made in all sizes.
Will cut from 2 in. to 24 in.
Pipe Cutting Tool
For Cutting Cast, Wrought Iron, Gas & Water Pipes.
THE ANDERSON PIPE CUTTER COMPANY, Manufacturers,
163 Liverpool st., E. Boston, Mass
N. Y. Office, 135 Greenwich S
C. H. TUCKER, JR., Manager.
WALDO BROS.,
102 Milk Street, Boston, Mass

The Unique Gas Water Heater.

THE QUICKEST WATER HEATER MADE
USING THE SAME AMOUNT OF GAS.

SIMPLE, INEXPENSIVE, EASILY ATTACHED. CAN BE CONNECTED TO A COAL RANGE. NO VALUABLE SPACE IS WASTED, AS IT IS PLACED DIRECTLY UNDER THE BOILER, BETWEEN THE ARMS OF THE STAND.



The Vulcan Thermostat.

While the use of the Vulcan Thermostat is not essential in connection with the Unique Water Heater, when it is so attached the cost of fuel is reduced to a minimum, and perfect satisfaction is secured.

The **VULCAN THERMOSTAT** can be applied to most any Water Heater, and automatically controls the gas supply. With its use there is absolutely no waste of gas.

Gas Appliances of All Kinds.
Gas Tubing and Gas Fittings.

WILLIAM M. CRANE COMPANY,

1131–1133 Broadway, New York.

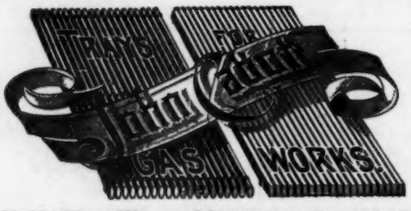
Foundry at Peekskill, N. Y.

Catalogue No. 15 is the Latest.

Special Trays for Iron Sponge or Oxide of Iron,

CHURCH'S TRAYS a Specialty.

Reversible, Strongest, Most Durable, Most Easily Repaired.



553-557 West Thirty-third Street, New York.

We also make the Cheapest and Strongest
REVERSIBLE BOLTED TRAYS IN THE MARKET.
Send for Circulars.

Bristol's Recording

PRESSURE GAUGE.

For continuous records of

Street Gas Pressure.

Simple in construction, accurate in operation, and low in price.

Fully Guaranteed. Send for Circulars.

THE BRISTOL CO.,

Waterbury, Conn.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE

Plans prepared and Estimates furnished at short notice.

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70 Rush St., Near Division Ave., **Brooklyn, N. Y.**

ALEX. C. HUMPHREYS, M. E., M. Inst. C. E. ARTHUR G. GLASGOW, M. E., M. Inst. C. E.

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BANK OF COMMERCE BLDG.,
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New York.

9 VICTORIA STREET,
London, S. W.,
England.

CONSULTING GAS ENGINEERS AND MANAGERS.
GAS PROPERTIES PURCHASED.

CHAPMAN VALVE MANUFACTURING CO.

MANUFACTURERS OF

Valves and Gates for Gas, Ammonia, Water, Etc.

Also, Gate Fire Hydrants with and without Independent Nozzle Valve. All Work Guaranteed.

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Chicago Office, 24 West Lake St. New York Office, 28 Platt St.
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Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

Double and Single Gate Valves, ¼" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.

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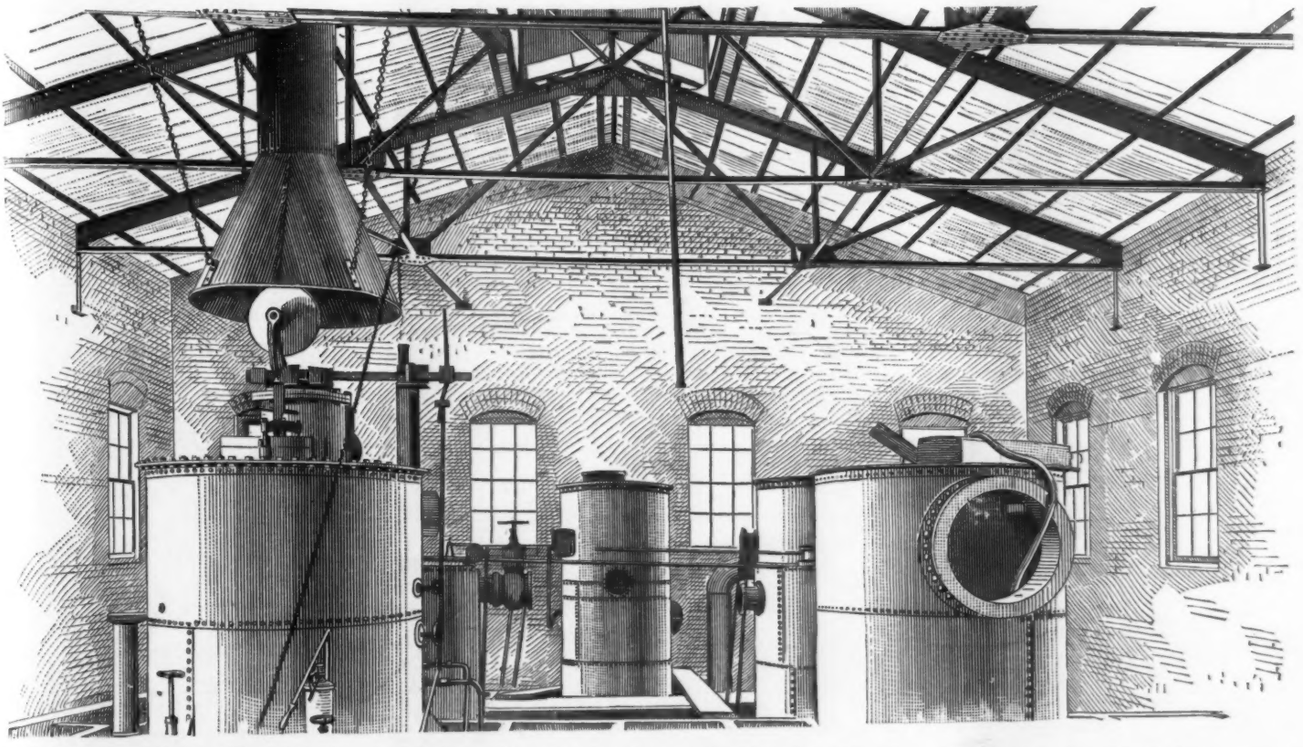
THE BERLIN IRON BRIDGE CO.

Engineers, Architects and Builders of Steel Structures.



The above illustration is taken direct from a photograph, and shows the construction of an Iron Truss Roof designed and built by us for the Lynn Gas and Electric Company, at Lynn, Mass. The building is 37 feet in width by 64 feet in length, with brick walls and an iron truss roof covered with corrugated iron. A building of this kind cannot possibly take fire, as the interior appointments are such that there is little or no woodwork used about the side walls or roof.

BOSTON OFFICE, 200 Equitable Building.
NEW YORK OFFICE, 718 Bennet Building, Cor. Fulton and Nassau Streets.

Main Office and Works, EAST BERLIN, CONN.

Gas Investments in California.

Nowhere else on this continent does such opportunity exist for profitable gas investment as on the Pacific Coast, since the perfection of the new LOWE Process for using the heavy crude California oils (of which there is an unlimited supply) without the use of any other fuels. Seven years' test proves the system to be perfect in every respect. Los Angeles alone, in addition to present street mains, has 150 miles of well built up streets without a gas main on them. To occupy this territory, and a large number of other towns now without gas, we have organized a parent company and a number of local companies covering some of the fastest growing cities in the United States.

Now is the time to invest, when the first capital will be able to double itself in a single year. This is also the most delightful residence section in the United States.

We suggest to those desiring gas investments, in large or moderate amounts—with or without active business connections—to come here and investigate; or, what is the next best thing, write us for particulars and prospectus.

The accompanying cut shows the oil wells in the suburbs of Los Angeles from which the Companies under the NEW LOWE GAS PROCESS obtain their supply of oil.

AMERICAN GAS & COKE CO. (T. S. C. Lowe, Manager),
406 Bradbury Building, Los Angeles, California.

Coal Tar Genealogical Tree.

Mr. T. Viner Clarke, of London, Eng., having compiled a novel Chart or Map illustrating the various CHEMICAL PRODUCTS DERIVED FROM COAL AND COAL TAR, in the form of a Genealogical Tree, including all the products discovered (the total number amounting to near 700), offers for sale a limited number of copies in Colors, mounted on Linen, with Rollers. Price, $3.50. Orders may be sent to **A. M. CALLENDER & CO., 32 Pine Street. New York City.**

AMERICAN GAS COMPANY

Constructors of Coal Gas Apparatus.

KLONNE-BREDEL

Recuperative Furnaces, Washers, Condensers, Purifiers and Purifying Machines, Ammonia Plant, Coke Conveyers, Etc.

Complete Works Erected with Guaranteed Results.

EASTERN AGENTS FOR

FRED. BREDEL'S SYSTEM
COAL GAS PLANTS AND GAS APPARATUS.

P. H. & F. M. ROOTS CO.'S
Exhausters, Blowers, etc.

222 South Third Street, Philadelphia, Pa.

GEORGE G. RAMSDELL, General Manager. Correspondence Solicited

FRED. BREDEL, C.E.

Coal and Water Gas Plants.

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RECUPERATIVE FURNACES, WASHERS, CONDENSERS, PURIFIERS, PURIFYING MACHINES, COKE CONVEYERS, ETC

SOLE UNITED STATES AGENT FOR
ARROL-FOULIS MECHANICAL CHARGING AND DRAWING MACHINES.

Gas Enriching Plants to Enrich Coal Gas up to 24 Candle Power, and Making a White, Bright, Non-smoking Gas

GAS RETORTS AND SPECIAL BLOCKS AND FIREBRICK MANUFACTURED UNDER THE SUPERINTENDENCE OF MY OWN CHEMIST.

COMPLETE GAS WORKS

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Eastern Agents: AMERICAN GAS CO., Construction Department, 222 So. 3d St., Phila., Pa

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LATEST IMPROVED GAS EXHAUSTER

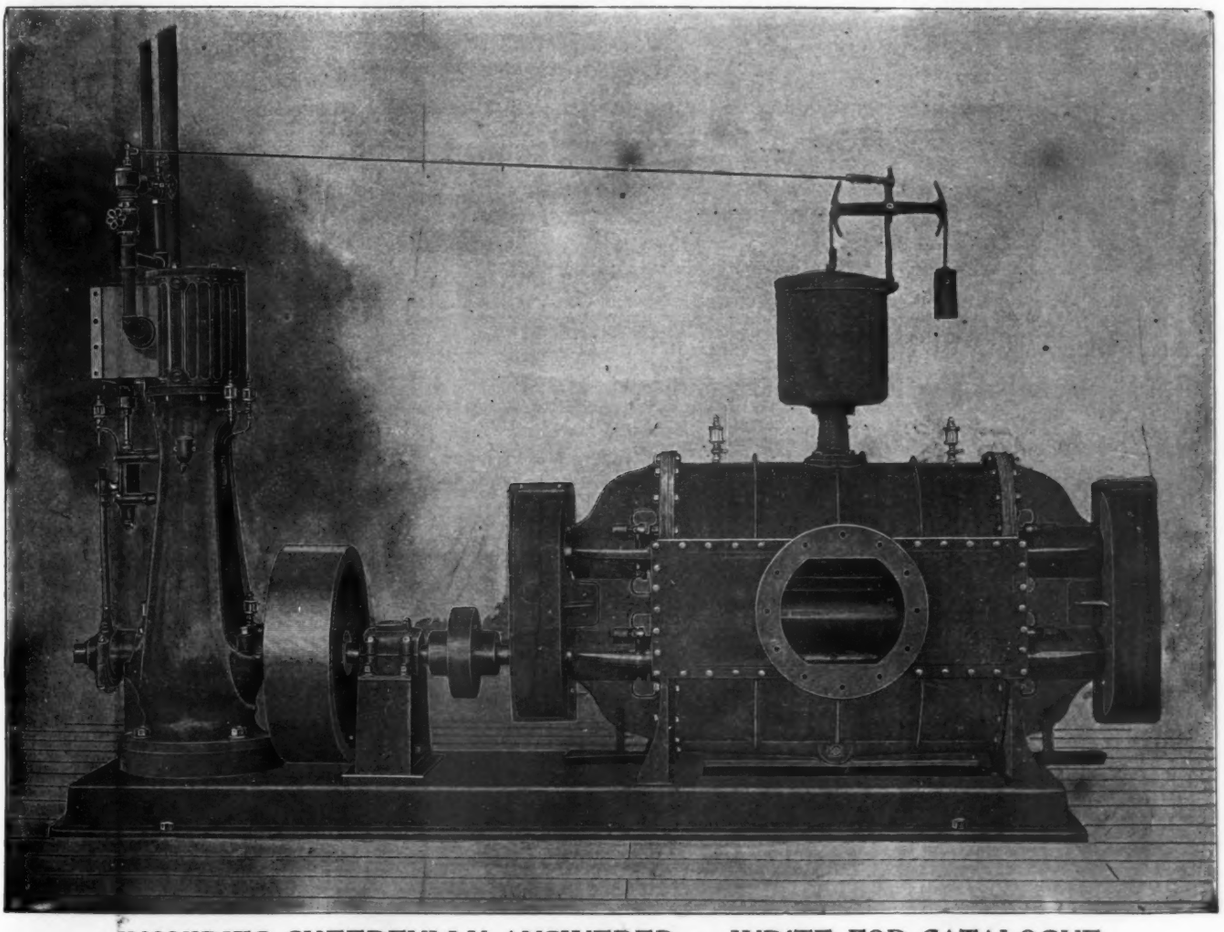
—AND—

NEW GAS GOVERNOR AND STEAM VALVE.

GUARANTEED TO REGULATE WITHIN ONE-TENTH OF AN INCH, WATER PRESSURE.

The Most Perfect Gas Governor on the Market.

MORE DIRECT IN ACTION. FEWER PARTS.
EASIER TO ADJUST THAN ANY OTHER GOVERNOR.



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P. H. & F. M. ROOTS CO.,

Connersville, Ind. 109 Liberty St., New York.

Eastern Office:

American Gas Company,

222 South Third Street, Philadelphia, Pa.

NEW YORK, 33 NASSAU ST. PHILADELPHIA, 1932 MARKET ST. CHICAGO, 54 LAKE ST.

WELSBACH STREET LIGHTING COMPANY

OF AMERICA,

—OWNS, CONTROLS AND OPERATES—

EXCLUSIVELY

THE NEW IMPROVED AND PATENTED STREET LIGHT BURNER.

STYLE No. 81.

Our PATENTED "STREET LIGHT APPLIANCES" have made WELSBACH STREET LIGHTING a complete success.

By the UNIFORM DISTRIBUTION of light on scientific principles a greater area can be lighted by our system and more economically than in any other way.

Where there are no gas mains already laid, we can furnish an equally good light by our **SELF-GENERATING NAPHTHA WELSBACH BURNER,** enabling Gas Companies to furnish a uniform light in all localities.

Lists of Cities and Towns in which we are now lighting under contract will be furnished upon application.

STYLE No. 97.

CORRESPONDENCE SOLICITED FROM GAS COMPANIES AND OTHERS INTERESTED IN MUNICIPAL LIGHTING.

NOW READY.

THE SIXTH (AND CENTENARY) EDITION

— OF THE —

Handbook for Gas Engineers and Managers.

By THOMAS NEWBIGGING, M. Inst. C.E.

This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry.

PRICE, - - $6.00.

A. M. CALLENDER & CO., - - No. 32 Pine Street, N. Y. City.

PRACTICAL HANDBOOK ON

GAS ENGINES

With Instructions for Care and Working of the Same.

By G. LIECKFELD, C.E.

Translated with Permission of the author by GEO. M. RICHMOND, M.E.

Price, $1.00.

A. M. CALLENDER & CO., 32 Pine Street, New York.

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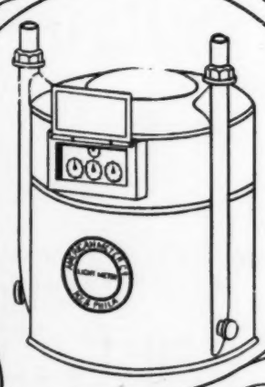
AMERICAN METER CO.

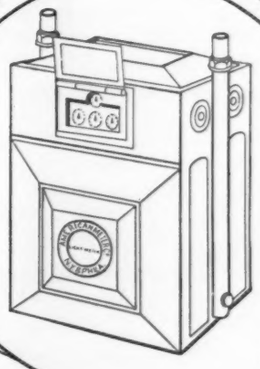
ESTABLISHED 1834. INCORPORATED 1863.

NEW YORK AND PHILADELPHIA,

CHICAGO, ST. LOUIS,

SAN FRANCISCO.

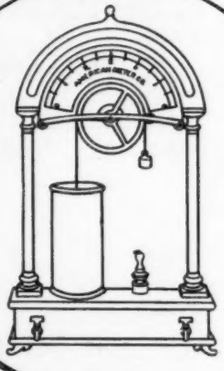


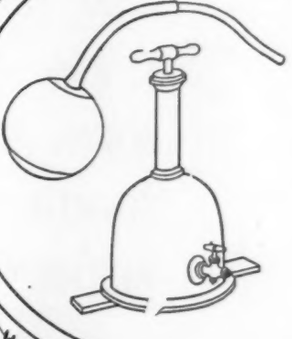


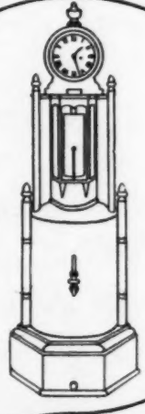
PUBLIC LIGHTING TABLE.

JUNE, 1899.

Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Thu.	1	7.50 PM	1.50 AM	7.15	3.15
Fri.	2	7.50	2.20	7.15	3.15
Sat.	3	7.50	2.50	7.15	3.15
Sun.	4	8.00	3.30	7.25	3.15
Mon.	5	8.00	3.30	7.25	3.15
Tue.	6	8.00	3.30	7.25	3.15
Wed.	7	8.00 NM	3.30	7.25	3.15
Thu.	8	8.00	3.30	7.25	3.15
Fri.	9	8.00	3.30	7.25	3.15
Sat.	10	8.00	3.30	7.25	3.15
Sun.	11	8.00	3.30	7.25	3.15
Mon.	12	9.30	3.30	7.25	3.15
Tue.	13	9.50	3.30	7.25	3.15
Wed.	14	10.20	3.30	7.25	3.15
Thu.	15	10.40 FQ	3.30	7.25	3 15
Fri.	16	11.00	3.30	7.25	3.15
Sat.	17	11.30	3.30	7.25	3.15
Sun.	18	12.00 AM	3.30	7.30	3.15
Mon.	19	12.40	3.30	7.30	3.15
Tue.	20	1.20	3.30	7.30	3.15
Wed.	21	2.20	3.30	7.30	3.15
Thu.	22	No L.	No L.	7.30	3.15
Fri.	23	No L. FM	No L.	7.30	3.15
Sat.	24	No L.	No L.	7.30	3.15
Sun.	25	8.00 PM	10.20 PM	7.30	3.15
Mon.	26	8.00	10.50	7.30	3.15
Tue.	27	8.00	11.20	7.30	3.15
Wed.	28	8.00	11.50	7.30	3.15
Thu.	29	8.00 LQ	12.20 AM	7.30	3.15
Fri.	30	8.00	12.50	7.30	3.15

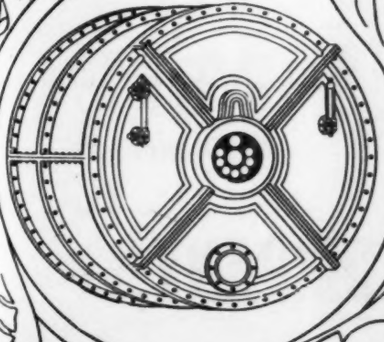


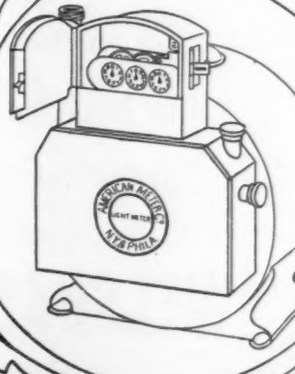




TOTAL HOURS LIGHTING DURING 1899.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	215.40	January	423.20
February	184.40	February	355.25
March	187.40	March	355.35
April	166.50	April	298.50
May	158.00	May	264.50
June	140.50	June	234.25
July	150.30	July	243.45
August	168.30	August	280.25
September	179.50	September	321.15
October	213.20	October	374.30
November	217.00	November	401.40
December	238.10	December	433.45
Total, yr.	2221.00	Total, yr.	3987.45





Welsbach Patent Again Sustained.

Following the recent decision in the United States Circuit Court of Appeals, sustaining the Welsbach Company's Patent, Judge Lacombe, in the United States Circuit Court, has enjoined the following infringers of the Welsbach Patent:

DAYLIGHT INCANDESCENT GAS LAMP CO.
REX INCANDESCENT GAS LIGHT CO.
AMERICAN INCANDESCENT LIGHT CO.
NEW YORK CHEMICAL REFINING CO.
UNION INCANDESCENT LIGHT CO.
AMERICAN LIGHTING CO.
YOUNG & FLETCHER CO.
HECKLA MANTLE WORKS, Henry Anhalzer, Prop'r.
MERIDEN-ALBERTA MANTLE CO.

You are cautioned against infringement of the Welsbach Patent, as you will be held liable for an accounting.

All genuine Welsbach Lights bear the trademark "WELSBACH," and are for sale by all first-class dealers in Gas Appliances.

WELSBACH COMMERCIAL COMPANY,

Philadelphia.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

THE STANDARD JUNIOR,

THE STANDARD DOUBLE SUPERHEATER,

LOWE WATER GAS APPARATUS.

Under Contract, 1899:

	SETS.	DAILY CAPACITY.
Fostoria, O.	1	250,000 Cubic Feet.
Derby, Conn.	1	750,000 "
Lowell, Mass.	1	1,000,000 "
Doylestown, Pa.	1	50,000 "
Darby, Pa.	1	400,000 "
Adrian, Mich.	1	125,000 "
Concord, N. H.	1	400,000 "
Sioux City, Iowa	1	750,000 "
Standard Gas Light Co., New York	3	5,400,000 "
Peekskill, N. Y.	1	250,000 "
Westchester, N. Y.	1	250,000 "
Jersey City, N. J.	1	1,000,000 "
Stapleton, N. Y.	1	750,000 "
London, O.	1	125,000 "
Chicago, Ills.	2	3,600,000 "
Putnam, Conn.	1	125,000 "
Total	19	15,225,000 "
Previously built	294	187,100,000 "
Grand Total	313	202,325,000 "

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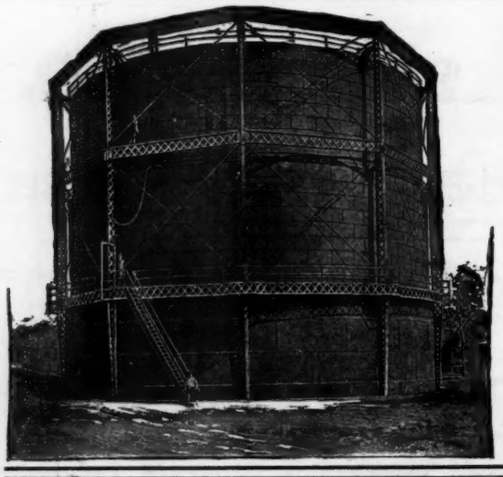

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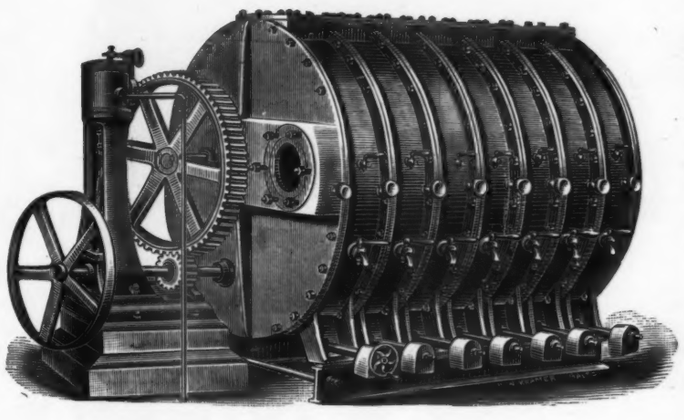

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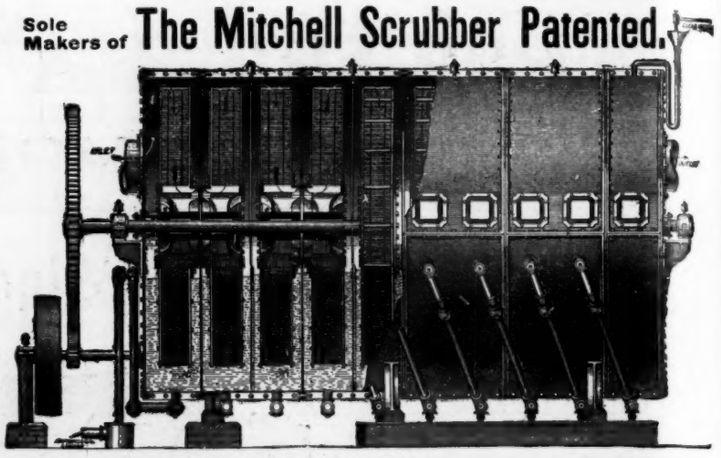

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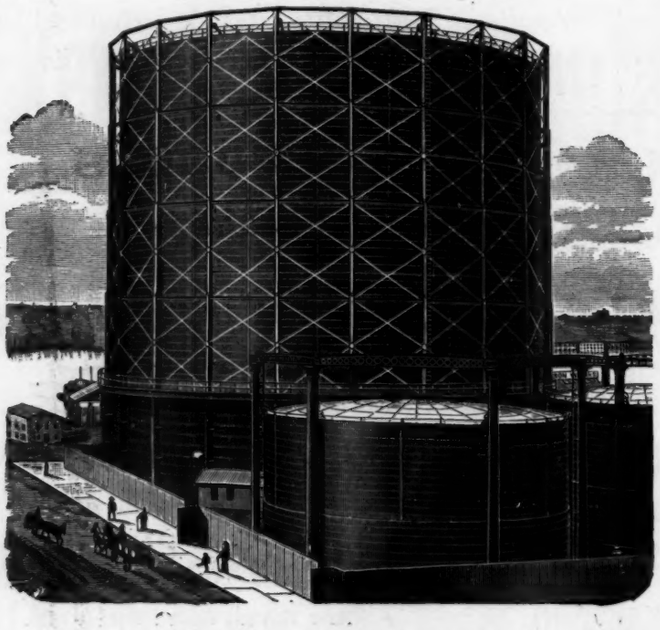

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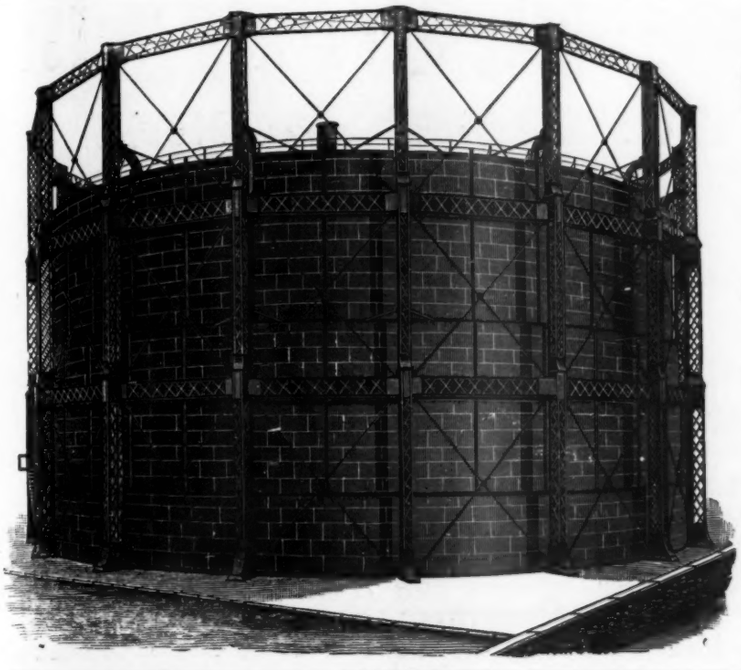

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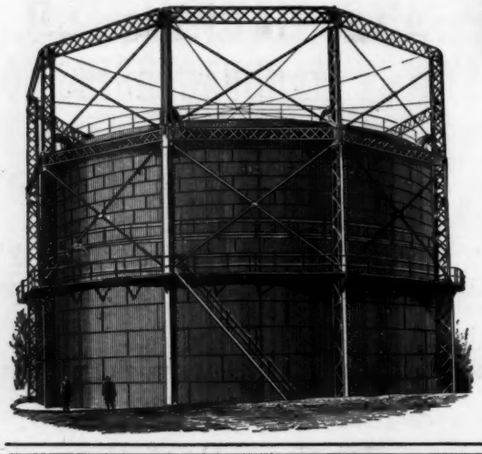

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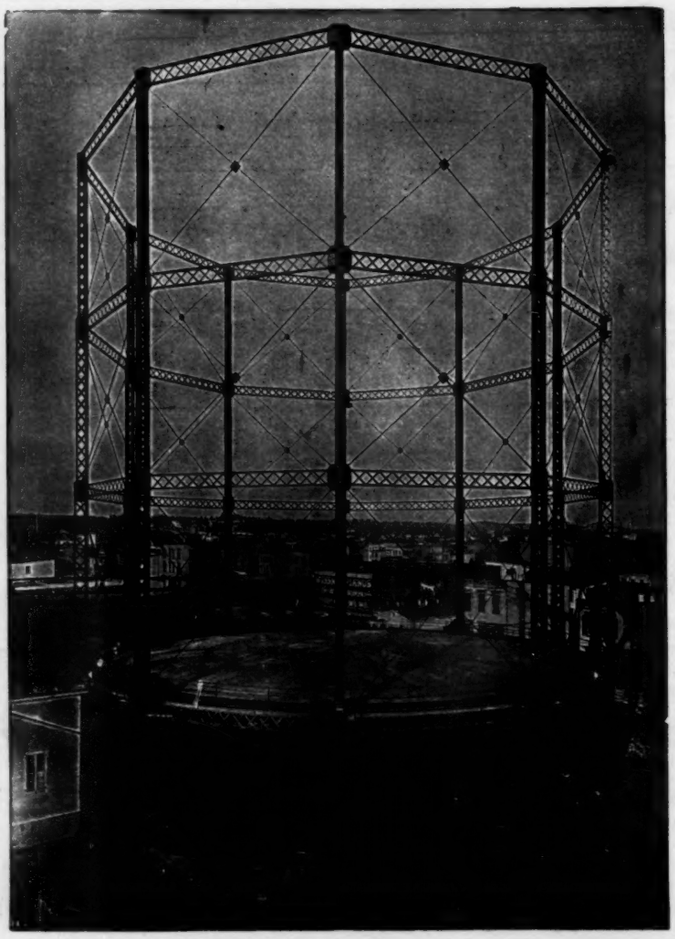

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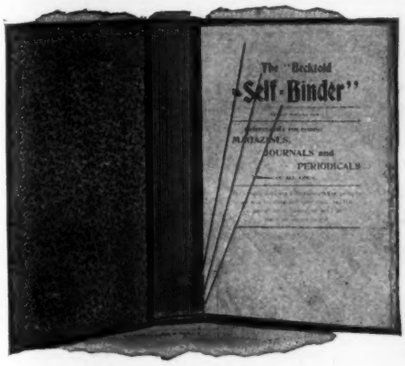

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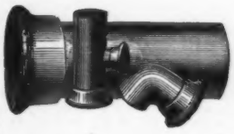

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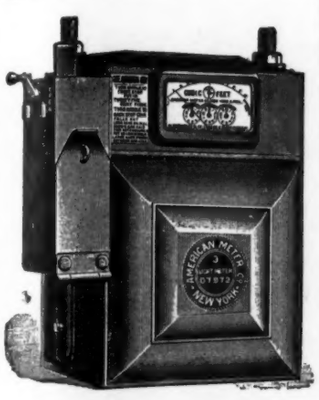

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